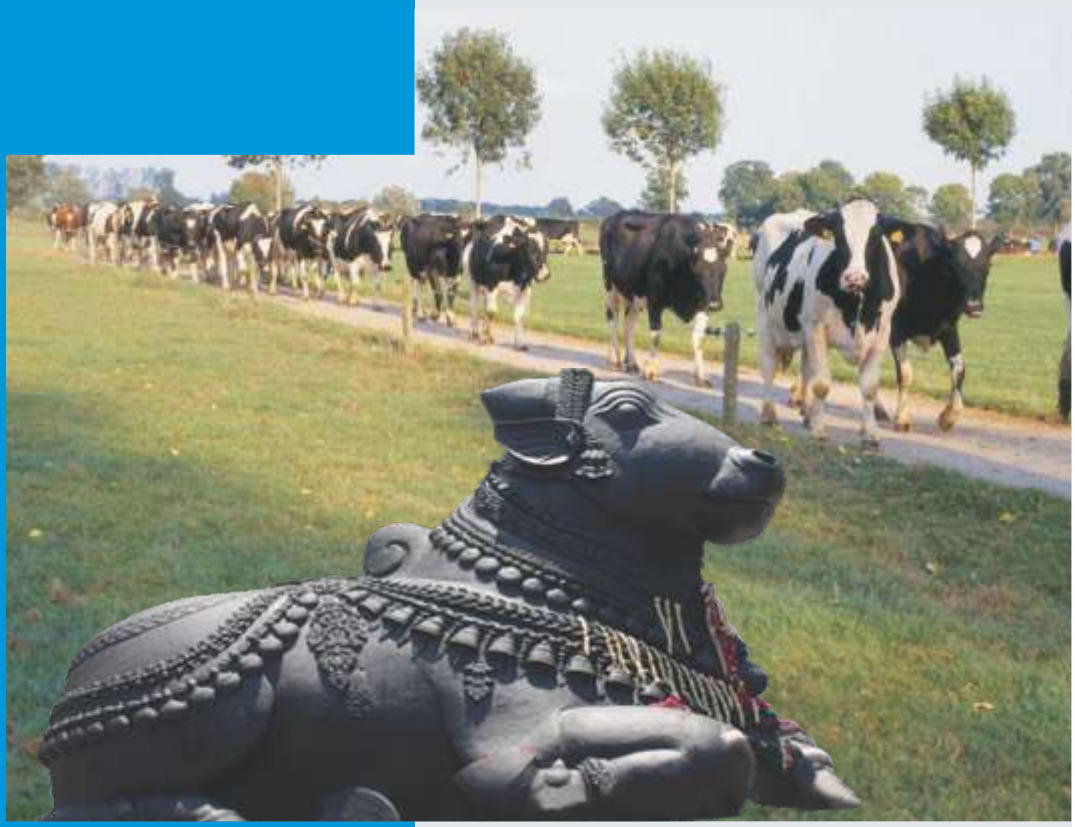
The Blue Cross Book

For the advancement of the veterinary profession



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From Editor's Desk

Pre and Post parturient period in Dairy animals are very crucial and most of high yielding crossbred animals are prone for many metabolic problems during this period. These problems have been addressed in this issue and several remedies for different metabolic diseases during pre and post calving period are discussed for the benefit of the readers.

Resistance to antibiotics in case of Mastitis is widely reported in India and indiscriminate use of high order antibiotics causes non recoverable cases of Mastitis among Dairy animals. Research has now reported that some samples have shown resistant to all the antibiotics checked, which needs to be noted specifically in the treatment of field cases.

Parasitic diseases of large animals are one of the biggest problems faced by the farmers and dairy owners. It causes huge economic losses because of negative productivity of the animals. Blue cross book has always given due importance to this issue and in this issue also it has been addressed. Several articles about ecto and endo parasitic diseases in large animals have been discussed, which may give valuable inputs to the readers.

Reproductive performance of large animals is the central dogma for the success of Dairy Industry. But there are lot of reproductive problems in the field especially dystocia in Buffaloes. Field Veterinarians have used different techniques with limited tools to treat the dystocia and obstetrical cases, which have been discussed in this issue, would be a good source of information for budding Veterinarians.

Articles about the alternative treatment for repeat breeders and herbal treatment for animals are discussed in this issue to add valuable information to the Veterinarians. Overall, this issue has covered all major aspects of Veterinary practice and new findings in the field of Veterinary research.

Clinical practice is also increasing to treat cases of pets and companion animals. This issue has discussed various canine diseases and disorders to relieve their pain and suffering. Canine practitioners will be inclined to readership of this publication.

On behalf of the entire Editorial team, we wish you a very happy and prosperous New Year 2018 for all the readers of Blue cross Book. May this year can bring you lot of knowledge and useful information to enhance your skills and performance in Veterinary field.

Dr. Yash Goyal
Managing Director,
MSD Animal Health

Dear Veterinarians,

We are very much happy to release the 36th edition of our **The Blue Cross Book**, a biannual technical journal for updating Veterinary professionals in various fields supporting the animal welfare and productivity. MSD-AH stands for its vision of Science for Healthier animals, by publishing the recent techniques adopted by Veterinary technical experts in fields of surgery, gynaecology, medicine and nutrition along with their research communications in the every issue starting from 1993 till date of the journal, for the benefit of field, farm and budding Veterinarians. We will continue our efforts in this direction with the support of contributors, professors, field Veterinary experts and all Veterinarians.

There is always a need to implement new techniques in the animal health management in order to achieve high productivity at low cost. MSD-AH is supporting the farmers by providing various training and tools in order to improve the health and nutritional management of the dairy and poultry farms for enhancing the productivity.

Reproductivity plays a major role in dairy farming, where there is a need for programs like calf a year to enhance the productivity of the farm. MSD-AH plays a major role in this especially by providing technical services, guiding the farmers with updated techniques apart from having a range of well known hormonal therapies.

Poultry farming in India is a well established agricultural sector providing good source of affordable animal protein to the Indian population. MSD-AH is always working for the introduction of various biologicals for control of emerging diseases in poultry, which are the major concerns affecting the performance of poultry farms in India.

I am sure that our efforts of bringing this issue of The Blue Cross Book will update readers with the new developments in Veterinary and Livestock productivity fields.

MSD-AH wishes you a Happy and Prosperous New Year 2018.

AQUATIC ANIMALS

Demand for fish protein is rising. Farmed fish is becoming more important to meet this demand and protect wild fish. Currently half of all fish consumed globally is farmed. At Merck Animal Health we must help forge a sustainable, environmentally conscious future for this aquaculture.

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SPOTLIGHT ON SLICE

THE UNIQUE SLICE SUSTAINABILITY PROJECT IS KEEPING SEA LICE UNDER CONTROL WHILE HELPING TO MAXIMIZE TREATMENT OUTCOMES AND REDUCE DEVELOPMENT OF RESISTANCE.

Review Articles

Research Articles

Clinical Articles

General Articles

*The information on Metabolic and Mineral Deficiency Diseases of animals has been provided by Dr. S. T. Borikar, Assistant Professor, Clinical Medicine, COVAS, Parbhani - 431402 (MS).

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Impact of Metabolic Diseases on Milk Production in Lactating Cows- A Review

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Abstract:

Metabolic disease result from disturbances in internal homeostasis brought about by an abnormal change in the rate of one or more critical metabolic processes. In dairy farming, metabolic diseases are of great concern to dairy farmers worldwide. Metabolic diseases are diseases of livestock caused by productivity practices when the body reserves of calcium, magnesium or energy cannot meet the metabolic needs. Correcting the diet for cows during the periods from late pregnancy to peak lactation is crucial in preventing these diseases. Management of dry cow plays an important role in the control of metabolic disorders near or at calving time. Calving and the first month after freshening are critical times for dairy cows. The major disorders affecting the fresh cows are usually the results of nutrition and feed management problems. This paper presents an overview on economic loss due to metabolic diseases in lactating cows. The important metabolic diseases include ketosis, milk fever, downer cow syndrome and fat cow syndrome, these directly or indirectly affect the health of dairy animals.

Keywords: Metabolic disease, Lactating Cow, Milk and Economic loss

Introduction:

Metabolic disorders of cattle are a group of diseases that affect dairy cows immediately after parturition. There are several metabolic disorders identified in dairy cows during the first month after parturition. The metabolic diseases such as ketosis, milk fever, fat cow syndrome and downer cow syndrome are the most common and expensive disease entities in lactating dairy animals. The disease conditions cause severe economic losses in terms of heavy reduction in milk yield and impaired reproductive performance. A major challenge for dairy producers and Veterinarians is to maintain a dairy cow health during the transition/periparturient period. The periparturient period of dairy cows refers to the time frame near parturition. The transition period for dairy cows is generally defined as the time period from 3 weeks prior to parturition through 3 weeks after parturition (Smith, 2005). It is a pivotal time in the production cycle of the cow, in which cattle are at great risk for the occurrence of most of production diseases.

Ketosis

Acetonemia and hypoglycemia are the synonyms of the ketosis. Ketosis is a metabolic disorder of dairy cattle characterized by relatively high concentrations of the ketone bodies (acetoacetate, BHB and acetone) and a low to normal concentration of glucoses in the blood (Brockman, 1979). Ketosis generally occurs 21 to

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40 days after parturitions. Ketosis is manifested clinically, the cows normally have a low glucose level (Ingvartsen, 2006). Clinically manifested ketosis is characterized by hypophagia, decreased milk productions, loss of body condition score, lethargy, hyperexcitabilty, hypoglycemia, hypoinsulenemia, hyper-ketonemia, hyperlipidemia and depleted hepatic glycogen (Bobe et al., 2004). Ketosis in dairy cattle is defined as the increase in concentrations of ketone such as BHB, acetoacetate, and acetone. This increase in ketone concentrations in the serum of fresh cows has a negative impact on the health of the cow and is associated with a loss in milk production. Fresh cows have a high risk for ketosis within the first 30 days in milk due to low dry matter intake and the rapid mobilization of fat after parturition. In addition, ketosis in fresh cows is most commonly associated with a negative energy balance postpartum. Guernsey cows seems to be more susceptible to ketosis. Cross bred of cattle and is more susceptible to the diseases. Cows of any age may be affected but mature cattle in their third to fourth lactation are highly susceptible as they attain maximum milk yield during this period.

Clinical finding:

Two major forms of bovine ketosis are described – wasting and nervous. The wasting form is the more common of the two and manifest with a gradual but moderate decrease in appetite and milk yield over 2-4 days. The cow first begins to show dullness, depression, a staring expression, loss of appetite and low pick at her feed, and leave some grain. She may progress from leaving most of the grain and some silage to the stage of eating only small amounts of hay and preferring to eat bedding. Farmers usually describe affected cows has having a "woody "appearance due to the apparent wasting and loss of cutaneous elasticity due to presumably to disappearance of subcutaneous fat. The cow is moderately depressed and the hangdog appearance and disinclination to move. A characteristics odor of ketone is detectable on the breath and often in the milk Radostits *et al*. (2000).

The nervous signs usually occur in short episode which last for 1 or 2 hours and may recur at intervals of about 8 to 12 hours. Affected cows may injure themselves during the nervous sign. The nervous signs which occur in some cases of bovine ketosis are thought to cause by the production of isopropyl alcohol, a break down product of acetoaceticacid in the rumen. The characteristics sign of nervous form include:

1. Walking in circles
2. Straddling or crossing of the legs
3. Head pushing or leaning in to stanchion
4. Apparent blindness
5. Aimless movement s and wandering
6. Vigorous licking of the skin and an inanimate objects
7. Deprived appetite
8. Chewing movements with salivations.

Line of Treatment:

Radostits *et al*. (2000) divided therapy of ketosis in two parts-

(a) Replacement therapy

(b) Hormonal therapy

(a) Replacement therapy: The only rational treatment in ketosis is to relieve the need for glucose formation from tissue and allow ketone body utilization to continue normally. The intravenous injections of a 50% 500mL solution of glucose results in transient hyperglycemia, increased insulin, decreased glucagon and

reduced plasma concentration of non esterified fatty acids. A significant proportion of the administered glucose is lost to urinary excretion (Fox, 1971). To overcome the necessity for repeated injections, propylene glycol @ of 225gram twice daily for two days followed by 110gram daily for two days to cattle. 10 to 50% glucose @ 0.5 gram/ Kg body weight intravenous along with short acting insulin @ 0.5 unit Kg body weight injected subcutaneously after 10 to 15 minutes of initiations of intravenous glucose therapy is also fruitful treatment in case of ketosis (Sharma, *et al*., 2008).

(b) Hormonal therapy:

Administration of adrenal corticoids is a modern treatment which is dramatically successful in field cases. Betamethasone and dexamethasone are very much effective and can be given up to 30 mg intramuscularly. Prednisolone @ 10mL in large animal and 5 mL in small animal are also effective in case of ketosis. One mL solution contains 10mg prednisolone. Glucocorticoids reduce ketone body formations by utilization of Acetyl CoA and raising blood glucose by making greater availability of glucose precursor in the liver (Chakrabarti, A., 2006). Anabolic steroids like trenbolone acetate @ 60 to 120mg is effective as single injection for the treatment of the ketosis. Insulin facilitates cellular uptakes of glucose, suppresses the fatty acids metabolism and stimulate hepatic gluconeogenesis. The dose of protamine zinc insulin is 200 to 300 IU per animal administered subcutaneously every 24 to 48 hours as required.

Prevention and control:

Biochemical monitoring of herds for sub clinical ketosis and adequacy of periparturient feeding can be practiced using blood glucose estimations of cows in their second week of lactations. Blood glucose levels of below 35mg/dL suggest subclinical ketosis. Testing for ketone in urine or milk of cows in their first or second week of lactations recommended for early detection of ketosis and early treatment to prevent milk loss and ketosis associated diseases. Propylene glycol used for the prevention of clinical and sub clinical ketosis. Propylene glycol has been drenched to the cattle in the early lactation at doses varying from 350 1000mL daily for 10 days after calving. Glycerol can be substituted for propylene glycol at equivalent doses rates. Propionic acid 110gram/ day fed daily for 6 weeks, commencing at calving has given good result in the reducing the incidence of clinical bovine ketosis and improving the production. Monensin can be administered as a slow release capsule to cattle 2 to 4 weeks before calving. The capsule contains 32 gram monensin and releases approximately 335mg monensin for 95 days. It takes reduction in plasma levels of BHBA and reduced prevalence of clinical ketosis. Avoid excessive fattening of the animal, abrupt changes in the feeding schedule, feeding large amounts of silage to the animal. Provide adequate amounts of good quality roughage and recommended amounts of protein, vitamins, and minerals to the animals.

Economic Loss:

Ketosis is major causes of loss to the dairy farmers. Ketosis is accompanied by decreased milk yield and lower milk protein and milk lactose, and increased risk for delayed estrous and lowered first conception rates and increased inter calving intervals.

Milk Fever

This disease has been known by a number of terms including parturient paresis, milk fever, parturient apoplexy, calving paralysis and post parturient hypocalcaemia (Littledike *et al*., 1981). Milk fever is clinically characterized by weakness, recumbency, ultimately shock and death. Further, increasing production of milk

after calving places an enormous demand for glucose and minerals at a time when feed intake would not have reached its peak, leading to draining of glucose and calcium from the blood and leaving the milch animal's metabolism under severe stress, as transitions to lactation (Bethard and Smith, 1998). Milk fever is a metabolic disease occurring most commonly within 48 hours of parturition in high producing dairy animals. A depression of levels of ionized calcium in the tissue fluids is the basic biochemical defects in the milk fever. Onset of lactation caused by an imbalance calcium output in the colostrums and influx of calcium to the extracellular pool from intestine and bones. Thus, milk fever management is economically most important, as it results in not only reduction in milk production, but also loss of animals (Thirunavukkarasu *et al*., 2010a).The incidence is highest in the Jersey breed (Littledike, 1974). Disease commonly occurs in 5 – 10 years age group and most marked in third to seventh parturition.

Clinical Findings:

Stage-I

In this stage the cow is still standing. This is also brief stage of excitement and tetany with hypersensitivity and the muscles tremors of head and limbs. The animal is disclined to move and does not eat. There may be slight shaking of head, protrusion of tongue and grinding of teeth. The rectal temperature is usually normal to slightly above due to much excitement. Stiffness of the hind limbs is apparent, the animal is ataxic and falls easily and on going down, the hind legs are stuck and stiffy.

Stage-II

The second stage is prolonged sternal recumbency, consciousness is usually depressed. The cows has drowsy appearance in sternal recumbency usually with a lateral kink in neck or head turned into flank ('S' shaped posture).The muzzle is dry, the skin and extremities cool and the rectal temperature subnormal (97-101°F). There is marked decrease in the absolute intensity of heart sounds and or increase in the rate. The arterial pulse is weak and the venous pressure is also low making it difficult to raise the jugular vein. Ruminal stasis and secondary bloat are common and constipation is characteristics. There is also relaxation of the anus and loss of anal reflex. Characteristics dung protrudes out but will not be voided.

Stage-III

The third stage is lateral recumbency. The cows are almost comatose and although the limbs may be stuck out there is complete flaccidity. In general the depression of temperature and cardiovascular system so marked. The heart sounds are almost inaudible and rate increased up to 120 / minute, pulse impalpable and it may be impossible to raise the jugular veins. Bloat is usual because of lateral recumbency.

Line of Treatment:

Every effort should be made to treat affected cows as soon as possible after clinical signs are obvious. Treatment during the first stage of the disease, before the cow is recumbent is the ideal situation (Radostits, *et al.*, 2007). Oral calcium supplementation is the best approach for hypocalcaemic cows that are still standing, such as a cow in stage-1 hypocalcaemia or who have undected subclinical hypocalcaemia (Oetzel, 2011). Calcium borogluconate at 10-200gm is the treatment of choice. Most cows with milk fever can be treated successfully with 8-10gm of calcium. For cattle, 400-800ml of a 25% solution is the usual dose (Radostits, *et al.*, 2007). A general rule for dosing is 1gm calcium/45kg body weight. Giving larger dose of calcium in intravenous treatment has no benefit (Doze, *et*

al., 2008). Half of the calculated dose is administered by slow intravenous route and remaining 50% is by subcutaneous route. The subcutaneous calcium acts as a depot for steady calcium level maintenance. Composite solutions containing calcium, magnesium, phosphorus and glucose are recommended to non responsive and relapse cases with initial calcium therapy (Sharma, *et al.*, 2009).

Prevention and control:

The key to prevention of milk fever is management of a close-up dry cow or management during late pregnancy. Preventing of milk fever is to limit Ca intake during the dry period. This will allow the dry cow to adapt to Ca deficiency and make her better able to respond to milk Ca demand in early lactation. Feeding high Ca forages (alfalfa hay and silage) should be restricted during the dry period. Replacing part or all of the alfalfa forages with grass hay or silage, cuts Ca consumption during the dry period and helps prevent milk fever. In cows fed limited amount of Ca and P during the dry period, bone and small intestine respond better to stimulation from parathyroid hormone and active vitamin D. Cations have a positive charge like sodium, potassium, calcium and magnesium. Cations in the diet promote a more alkaline (higher blood pH) metabolic state which has been associated with an increased incidence of milk fever. Anions have a negative charge such as chloride, sulfur and phosphorus. Anionic salts reduce the incidence of milk fever by increasing the mobilization of Ca from bones. It has been discovered that milk fever can be effectively treated and/or prevented by feeding (dairy cows during the close up period (14 to 21 days pre-calving) a diet containing substantial amounts of negative ions (Markandeya *et al.*, 2009).The calf should be removed from the cow and for the first 48 hours only sufficient milk should be drawn for the calf maintenance. A gradual return of full milking can be permitted. Provide magnesium chloride in water. Prevent animals from becoming over fat and give them plenty of exercise.

Economic Losses:

Economic losses due to milk fever occur from expenditure on treatment of disease-affected animals and reduction in quantity of milk. Rajala-Schultz *et al*. (1999) found that milk fever alone caused a milk loss of between 1.1 and 2.9 kg/d during the first 4 to 6 weeks following parturition. It can also reduce the productive life of the cow by as much as 3.4 years. Milk fever also increases the risk of other production diseases, primarily because it has a detrimental effect on smooth muscle function

Downer Cow Syndrome

This condition is also described as post parturient recumbency. The disease usually occurs most commonly within the first 2 or 3 days after calving in high yielding dairy cows. Disease is clinically characterized by prolonged recumbency even after two successive treatments with calcium. Prolonged recumbency results varying degrees of ischemic necrosis of the major muscles of hind limbs. It causes additional complication such as acute mastitis, Decubitus ulcers and traumatic injury to the limbs. The incidence appears to be fairly high in intensive keeping system; during the coldest month (December, January and February). Holstein breed of cow is most susceptible.

Clinical Findings:

Animals are usually bright and alert eat and drink moderately well. Rectal temperature and respiration rates are within normal range. The heart rate may be normal or elevated to 80-100 beat/ minute. Defecation and urination are

normal but proteinuria is common. Some effected cows may make no efforts to stand. Some others will make frequent attempt to stand but are unable, extend their pelvic limbs and lift their hindquarters more than 20-30 cm. from the ground. These frequent attempts to stand results in "crawling or creeping" along the ground with both hind limbs in a partially flexed position and displaced posteriorly- the frog like attitude. As the condition advanced decubital ulcers develop on sternum, hock joint and elbow joint which may get infested with maggots. The prognosis is poor in recumbent animals after 7 days and most of them die due to myocarditis and or decubital septicemia.

Line of Treatment:

The most important aspect of treatment is to provide the most comfortable bedding possible and roll the cow from side to side several times daily to minimize the extent of ischemic necrosis and paraplegia which results from prolonged recumbency (Radostits, *et al*., 2007). A sand or dirt pack is the ideal ground surface which facilitates standing when downer cows attempt to stand (Cox and Marion, 1992). Attempt should be made with the help of different types of cow lifting devices to make the animal stand on its own limbs. This should be done at least once or twice in a day. Physiotherapy in the form of massage of the muscles of limbs and use of infrared lamps improve the blood circulation to the damaged muscles. A water floatation tank has been designed for the management of downer cow (Smith, *et al.*, 1997).

Therapeutic management includes supplementation of composite solution containing calcium, magnesium, phosphorus and glucose @ 400-600mL intravenously and balanced electrolyte solution @ 1000mL intravenously for 3-5 days. Oral supplementation of potassium acetate @ 30-60gm once in 3days helps in relieving hypocalcaemia. Use of nervine tonics containing vitamin B_1, B_6 and B_{12} intramuscularly for 5days gives good result (Sharma, *et al*., 2009).

Prevention and control:

Early detection of milk fever and its proper treatment helps in reducing the incidence of downer cow syndrome. Peri parturient cows should be provided good bedding and once recumbent, treatment should be initiated at the earliest. Frequent rolling from side to side on hourly basis should be done till animal make attempt to get up. Cow should not be mated with heavy bull. The risk of paralysis and fracture of hip bones, cow should be bred as per its size as a big calf in small cow will invite dyctocia problem leading to calving paralysis. Cow should not be made over fatty through too much feeding during advance pregnancy.

Economic Loss:

Treatment of cows severely affected with fat cow syndrome is expensive, time consuming and often ineffective. Practical control of these diseases must be affected through management. There is lack of evidence regarding quantification of economic losses due to downer cow syndrome in dairy.

Fat Cow Syndrome

The disease has multiple etiologies and occur a few weeks before or after parturitions in obese and high yielding animals and is associated with decreased health status and reproductive performance. This disease has been known by a number of terms including pregnancy toxaemia, fatty liver and hepatic lipidosis. Disease is clinically characterized by anorexia, depression, and weakness and persistence weight loss followed by recumbency. Fat cow syndrome is a metabolic disease that occurs when the rate of fatty acid uptake and etherification by the liver

exceeds the rate of fatty acids depletion either through oxidation or export as triglycerides (Bendixen, *et al*., 1987).During early lactation many dairy cows are in negative energy balance. Increased demands in high yielding dairy animals immediately after parturition results in excessive fat mobilization from the body reserves especially from the subcutaneous fat depots. This fat is transported to the liver for hepatic gluconeogenesis. As the ruminant liver has a limited capacity to transport very low density lipoprotein (VLDL) out of the liver. They are more prone for lipid infiltration and develop fatty liver. There is development of hypoglycemia, ketonaemia and hepatic failure and animals become recumbent and eventually die.

Clinical Findings:

Affected animals reveal anorexia, depression, weakness and persistent weight loss followed by recumbency. Such recumbent cows develop severe ketosis and have strong ketotic odor and do not respond to glucose treatment. Some animal's show nervous signs like star grazing and tremors of head and neck. The rectal temperature respiration rates are within normal range. Rumen contractions are weak or absent and faeces are usually scanty. Affected cow will not eat and gradually becomes weaker and die within 7 to 10 days.

Line of Treatment:

The prognosis for severe fatty liver is unfavorable and there is no specific therapy (Radostits, *et al*., 2007). Supplementation of glucose along with calcium and magnesium salts to correct the negative energy balance should be attempted. Supplementation of long acting protamine zinc insulin @ 200 units /cow at every 12 hours is indicated for better utilization of glucose and suppressing hepatic gluconeogenesis. Subcutaneous administration of choline chloride (25 gm in 250mL of saline) helps in clearing the lipoproteins from the liver. Methionine @ 40-50 gm daily given orally is also a good alternative. Niacin @ 6-12 gm/cow/day helps in reducing the hepatic lipiodosis. Use of vitamin-E, selenium and cellular antioxidants is quite effective (Sharma, *et al*., 2009).

Prevention and control:

Fattening of the cows during pregnancy should be prevented and animals should be given limited amount of concentrate during the dry periods. In the daily rations approximately one third roughage should be included. The cow's body condition in the late lactation and during dry periods should be monitored to ensure that cow is not over- conditioned.

Economic Loss:

Fat cow syndrome is results in decreased milk yield, infertility and increased risk of several diseases: ketosis, parturient paresis, displaced abomasum, mastitis, retained placenta.

Conclusion:

Metabolic disease is a major cause of economic loss to dairy farmers. To prevent the metabolic disease provide balance nutritional diet during dry, pregnancy and lactation period according to the requirements of the animals. Dairy farmer should be aware about metabolic diseases.

References:

Bendixen P. H., Vilson B. and Ekesbo I, Astrand D. B. (1987), Disease frequencies in dairy cows in Sweden II. Retained Placenta. Prev. Vet. Med **5**:87-97.

Bethard G. and Smith J. F., (1998), Controlling Milk Fever and Hypocalcaemia in Dairy Cattle: Use of Dietary Cation-Anion Difference (DCAD) in Formulating Dry Cow Rations. Technical Report 31, Agricultural Experiment Station, Cooperative Extension Service, College of Agriculture and Home

Economics, New Mexico State University, 1.

Bobe G., Young J. W. and Beitz D. C., (2004), Invited Review: pathology, etiology, prevention and treatment of fatty liver in dairy cow. *J. Dairy Sci*. **87**: 3105-3124.

Brockman R. P., (1979), Roles of insulin and glucagon in development of ruminant ketosis. *Can Vet J.* **20**(5): 121- 126.

Chakrabarti A., (2006), Metabolic Diseases. IN: Text Book of Clinical Veterinary Medicine. Third revised enlarged Edition, Kalyani Publishers, New Delhi-110002. Pp.563 – 616.

Cox V. S. and R. S Marion, (1992). *Vet Rec.* **130**:74.

Doze J. G., R. Donars and Van der Kolk., (2008), Effects of intravenous administrations of two volume of calcium solution on plasma ionized calcium concentrations and recovery from naturally occurring hypocalcemia in lactating dairy cows. *Am.J. Vet. Res*. **69**: 1346-50.

Fox F. H., (1971), Clinical diagnosis and treatment of ketosis. *J. Dairy Sci*., **54**: 974.

Ingvartsen K. L., (2006), Feeding and management related diseases in transition cow. Physiological adaptation around calving and strategies to reduces the feeding related diseases. *Animal Feed Science technology*. Vol. 128 pp.175- 213.

Littledike E. T., (1974), Parturient Hypocalcaemia, Hypomagnesaemia, Mastitis-Metritis-Agalactia Complex of Swine. In: *B. L. Larson and V. R. Smith, Eds. Lactation–A Comprehensive Treatise.* Vol. II Academic Press, New York, NY. 335.

Littledike E. T., Young J. W. and Beitz D. C., (1981),. Common Metabolic Diseases of Cattle: Ketosis, Milk Fever, Grass Tetany and Downer Cow Complex. *Journal of Dairy Science*. **64**; 1465.

Markandeya N. M., Patil A. D. and Bharkad G. P. (2009), *Intas Polivet*, **10**(1): 13-19.

Otezel G. R., (2011), Non-infectious diseases: Milk fever. In Encyclopedia of dairy Sciences. Vol.2. F.J. W.. Fuquay, P.F. McSweeney, P.L.H., ed. Academic Press, San Diego.

Radostits O. M., Gay C. C., Blood D. C. and Hinchkliff K. W., (2000), Veterinary Medicine. 9th edn. ELBS & Baillier Tindall. pp.563-618.

Radostits O. M., Gay C. C., Hinchcliff K. W. and Constable, P. D., (2007), Veterinary Medicine. 10th edn. ELBS & Baillier Tindall. pp.1613-1690.

Rajala-Schultz P. J., Gröhn Y. T. and McColloch C. E., (1999), Effects of milk fever, ketosis, and lameness on milk yields in dairy cows. *J. Dairy Sci*. **82**: 288-294.

Sharma Neelesh, Upadhyay S. R. and Srivastava A. K., (2009). Bovine ketosis-An overview. *Agrovet Buzz*, **1**(6): 43-47.

Sharma M. C., Kumar M. and Sharma R.D., (2009), Metabolic Diseases. IN: Text Book of Clinical Veterinary Medicine. First Edition, ICAR, New Delhi- 110002. Pp.436 – 469.

Billy I. Smith, Carlos A. Risco (2005), Management of periparturient disorders in dairy cattle. *Vet. Clin. Food Anim*., **21**: 503-521.

Smith B. P., et al., (1997), Proc Am Assoc Bov Pract **30**:43.

Thirunavvkkarasu, M., Kathiravan, G., Kalaikannan, A & Jebarani, W. 2010. "Quantifying economic losses due to milk fever in dairy farms". Agri. Econ. Res. Rev. **23**: 77-81.

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Important Canine and Feline Zoonoses

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Abstract :

Dogs and cats have been sharing our environment for a long time and as pets they bring major psychological well-being to our modern urbanized society. However, they can be a source of human infection by various pathogens, including bacteria, viruses, parasites, and fungi. The important diseases are Rabies, Salmonellosis, Pasturellosis, Toxoplasmosis, Scabies, Lyme, Cat Scratch Disease, Dermatophytosis, Ancylostomisasis, Capnocytophaga Infection, Erlichiosis etc. Common sense and good personal and pet hygiene are the key elements to prevent such a risk of zoonotic infection.

Key words : Zoonoses, dogs, cats, human, diseases.

Introduction :

Zoonotic disease (zoonosis) is most commonly defined as any disease and/or infection which are naturally shared by human and vertebrate animals. People are frequently getting exposed to the bacteria, fungi, viruses, and parasites of animal species dwelling around human population that cause zoonoses in a number of ways. Human and dog relation is the mutually beneficial and dynamic. Cats have either a mutualistic or commensal relationship with humans. Cats are also used in the fur trade, as food, and to control pests. As dogs and cats are living with us or around us a little consideration should be given to the known and potential zoonotic infectious diseases of these companion animals. Dogs closely share the domestic environment with human and act as reservoir or source of many zoonotic diseases. Humans usually serve as accidental hosts that acquire the disease through close contact with an infected animal, who may or may not be symptomatic. Children are at the highest risk for infection because they are more likely to have close contact with pets. The route of transmission can be through the feces, urine, saliva, nasal discharge of the dog as well as cat. Hence, it becomes important for people working with or handling animal to know about potential zoonotic disease transmission and preventive measures against them. Here in this article some of the important zoonotic diseases from dogs and cats are discussed briefly.

(A) Rabies

Rabies is a zoonotic viral disease which is almost always fatal and can infect all mammals, including humans. Dogs are the main vector for human rabies. Rabies virus is a member of the Rhabdoviridae - RNA virus (lyssa virus). The animal hosts that maintain rabies virus in nature are carnivores and bats. Other animals do not play a role in the maintenance of the disease, but are victims of the disease. More than 99% of rabies cases in countries where dogs commonly have the disease are caused by dog bites. Rabies

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causes about 24,000 to 60,000 deaths worldwide per year. More than 95% of human deaths caused by rabies occur in Africa and Asia. The virus is usually present in the nerves and saliva of a symptomatic rabid animal. The route of infection is usually, but not always, by a bite. Humans become infected by the bite of an infected animal, mostly a rabid dog. After a bite immediate post-exposure treatment is needed. Animal control and vaccination programs have decreased the risk of rabies from dogs in a number of regions of the world. Immunizing people before they are exposed is recommended for those who are at high risk.

(B) Dermatophytosis

These are diseases of epidermal tissues of man and animals caused by fungi belonging to a group referred to as dermatophytes. They cause infections in the keratinous tissues like skin, hair, feathers, horns and nails. The disease is commonly known as ringworm and tinea. Several species belonging to genera *Microsporum* and *Trichophyton* are known to cause ringworms which are zoonotic in nature. The dermatophytes of animals are mostly parasitic on the hair and skin and are readily transmitted to people by direct contact. Dermatophytes that most often affect dogs and cats and can be transmitted to humans are: *Microsporum canis, Microsporum gypseum*; and *Trichophyton mentagrophytes*. M canis is the most frequent fungal agent of cats and dogs. Infections in kittens and puppies often result in scaly lesions with hair loss around the face, paws, and body. Clinically, other dermatologic lesions are similar, and suspected dermatophyte infections in both animals and humans should be culture confirmed. Identification of the infecting fungus will provide clues to the source of infection. At this time, prevention of dermatophyte infection in companion animals and resultant transmission to humans focuses on treating individually affected animals or animal populations (catteries). The focus is on treating both the individual animals as well as their environments, which can remain infective with fungal spores for up to 18 months.

(C) *Toxoplasma gondii*

Toxoplasmosis, caused by the protozoan parasite Toxoplasma gondii, is one of the most common parasitic infections of man and other warm-blooded animals. It has been found world-wide from Alaska to Australia. Nearly one-third of humanity has been exposed to this parasite. In most adults it does not cause serious illness, but it can cause blindness and mental retardation in congenitally infected children and devastating disease in immune-compromised individuals. Humans become infected by ingesting tissue cysts in undercooked or uncooked meat or by ingesting food and water contaminated with oocysts from infected cat faeces. Oocyst transmitted infections may be more severe than tissue cyst-induced infections. Contamination of the environment by oocysts is widespread as oocysts are shed by domestic cats and other members of the felidae. Domestic cats are probably the major source of contamination since oocyst formation is greatest in domestic cats. Cats may excrete millions of oocysts after ingesting only one bradyzoite or one tissue cyst, and many tissue cysts may be present in one infected mouse. Oocysts in soil do not always stay there, as invertebrates such as flies, cockroaches, dung beetles and earthworms can mechanically spread these oocysts and even carry them onto food and water. T. gondii organisms in meat can be killed by exposure to extreme heat or cold. Tissue cysts in meat are killed by heating the meat throughout to 67.8^{0}C or by cooling to -13.8^{0}C. Toxoplasma in tissue cysts are also killed by exposure to 0.5 kilorads of gamma irradiation. Meat of any animal should be cooked to 67.8^{0}C before consumption, and tasting meat while

cooking or while seasoning should be avoided.

(D) *Bartonella henselae* (Cat Scratch disease, CSD)

Bartonella bacteria cause several diseases in humans. The three most common diseases are cat scratch disease, caused by B. henselae, trench fever caused by *B. quintana* and Carrions disease caused by *B. bacilliformis.* People can get CSD from the scratches of domestic or feral cats, particularly kittens. The disease occurs most frequently in children under 15. Cats can harbor infected fleas that carry *Bartonella* bacteria. These bacteria can be transmitted from a cat to a person during a scratch. Some evidence suggests that CSD may be transmitted directly to humans by the bite of infected cat fleas, although this has not been proven. CSD occurs worldwide and may be present wherever cats are found. Stray cats may be more likely than pets to carry *Bartonella*. The symptoms may be Low-grade fever may be present. Enlarged, tender lymph nodes that develop 1-3 weeks after exposure. A papule or pustule at the inoculation site. Rarely, unusual manifestations such as eye infections, severe muscle pain, or encephalitis may occur. The preventive measures will not allow transmitting the infection. Avoid rough play with cats, particularly strays and kittens, to prevent scratches. This is especially important for immunocompromised individuals. Wash hands promptly after handling cats. Treat cats for fleas using fipronil and other spot-on treatments. Check with your veterinarian. Permethrin should not be used on cats.

(E) *Toxocara spp.*

Toxocariasis is the parasitic disease caused by the larvae of two species of *Toxocara* roundworms: *Toxocara canis* from dogs and, less commonly, *Toxocara cati* from cats. Toxocariasis is considered one of the Neglected Parasitic Infections, a group of five parasitic diseases that have been targeted by CDC for public health action. Infected dogs and cats shed *Toxocara* eggs in their feces into the environment. Once in the environment, it takes 2 to 4 weeks for *Toxocara* larvae to develop and for the eggs to become infectious. Humans or other animals can be infected by accidentally ingesting *Toxocara* eggs. People are more likely to be infected with *Toxocara* if they own a dog. Children and adolescents under the age of 20 are more likely to test positive for *Toxocara* infection. This may be because children are more likely to eat dirt and play in outdoor environments, such as sandboxes, where dog and cat feces can be found. This infection is more common in people living in poverty. Geographic location plays a role as well, because *Toxocara* is more prevalent in hot, humid regions where eggs are kept viable in the soil. There are two major forms of toxocariasis, visceral toxocariasis (VT), also called visceral larva migrans (VLM), and ocular toxocariasis (OT), also called ocular larva migrans (OLM). The syndromes VLM and OLM can be caused by infection with the migrating larvae of other kinds of parasites which cause symptoms similar to those caused by migrating *Toxocara* larvae. Controlling *Toxocara* infection in dogs and cats will reduce the number of infectious eggs in the environment and reduce the risk of infection for people. Have your veterinarian treat your dogs and cats, especially young animals, regularly for worms. This is especially important if your pets spend time outdoors and may become infected again. Clean your pet's living area at least once a week. Feces should be either buried or bagged and disposed of in the trash. Wash your hands after handling pet waste. Do not allow children to play in areas that are soiled with pet or other animal feces and cover sand boxes when not in use to make sure that animals do not get inside and contaminate them. Wash your hands with soap and warm water after playing with your pets or other animals, after outdoor

activities, and before handling food. Teach children the importance of washing hands to prevent infection. Teach children that it is dangerous to eat dirt or soil.

(F) *Ancyclostoma spp-*

Zoonotic hookworms are hookworms that live in animals but can be transmitted to humans. Dogs and cats can become infected with several hookworm species, including *Ancylostoma brazilense, A. caninum, A. ceylanicum,* and *Uncinaria stenocephala*. The eggs of these parasites are shed in the feces of infected animals and can end up in the environment, contaminating the ground where the animal defecated. People become infected when the zoonotic hookworm larvae penetrate unprotected skin, especially when walking barefoot or sitting on contaminated soil or sand. This can result in a disease called cutaneous larva migrans (CLM), when the larvae migrate through the skin and cause inflammation. Cutaneous larva migrans (CLM) is most often reported by returning travelers to tropical regions who have had soil and/or sand exposures in places where dogs and cats are likely to have hookworms. However, CLM is likely causing significant problems for the people who live in less developed parts of the world, even though the disease is not reported regularly. In less developed areas of the world, dogs and cats are often free-ranging and have high rates of infection with hookworm which leads to widespread contamination of sand and soil. Wearing shoes and taking other protective measures to avoid skin contact with sand or soil will prevent infection with zoonotic hookworms. Travelers to tropical and subtropical climates, especially where beach exposures are likely, should be advised to wear shoes and use protective mats or other coverings to prevent direct skin contact with sand or soil. Routine veterinary care of dogs and cats, including regular deworming, will reduce environmental contamination with zoonotic hookworm eggs and larvae. Prompt disposal of animal feces prevents eggs from hatching and contaminating soil -- which makes it important for control of this parasitic infection.

(G) *Giardiasis-*

Giardia intestinalis (*Giardia duodenalis, Giardia lamblia*) is a common, microscopic (intestinal) parasite that commonly affects humans, dogs, and cats. Common signs and symptoms of *Giardia* infection (in both humans and pets) are diarrhea, gas, abdominal discomfort, nausea, and vomiting. However, it is possible to be infected and have no signs or symptoms of illness. Anything that comes into contact with feces (poop) from infected humans or animals can become contaminated with the *Giardia* parasite. People and animals become infected when they swallow the parasite. It is not possible to become infected through contact with blood. Good hygienic maintenance of environment, use of safe and wholesome water, proper cooking of food items before eating as well as personel hygienic measure can control the infection to human being.

(H) *Pasturella spp*

Most common species are *Pasturella canis* and *Pasturella multocida*. Commensal organism within the oral cavity of dogs. Gram –ve, facultative anaerobes, coccobacillus. *Pasturella* is the most common organism isolated from dog bite wound. It is a commensal organism, so it can only be prevented by avoiding dog bites and cleaning any wounds thoroughly.

(I) *Capnocytophaga*

Capnocytophaga canimorsus (formerly DF-2, dysgonic fermenter). Commensal organism within the oral cavity of the dog (16%). It is fastidious gram negative rod. It causes

septicemia, shock, disseminated intravascular coagulation in immuno-compromised patients. It is a commensal organism, so it can only be prevented by avoiding dog bites and cleaning any wounds thoroughly.

(J) *Campylobacter spp*

Campylobacter ("curved bacteria") is a genus of Gram-negative bacteria. The three common species are *Campylobacter jejuni*, *C. coli, C. uppsaliensis*. These are comma-shaped, flagellated, gram-negative. It penetrates mucosal surfaces. Infection may transmit through contact with diarrheic dogs, especially puppies (50% to 75%), healthy dogs can also be intermittent shedders. About 6% of enteric campylobacteriosis transmitted by pet animals. Preventive measures to avoid the infection are 1) Infected animals should be isolated Hand washing after contact with pets, handling pet, pet's toys, feeding ustensils.2) Premises should be disinfected (bleach, quaternary ammonium compounds).

(K) *Salmonella spp*

Infectious agent is *Salmonella enterica*, many serovars. It is intracellular. The infection to human beings due to contact with diarrheic dogs, especially puppies; healthy dogs can also be intermittent shedders. About 3% of enteric salmonellosis transmitted by pet animals. Infected dogs can shed Salmonella for 20-40 days, up to 100 days. Up to 27% of dogs in one study culture +. Humans: after 12 hours to 36 hours of incubation: fever, nausea, abdominal pain, vomiting, diarrhea lasting less than a week. Interruption of contact with contaminated materials. Infected animals should be isolated, hand washing after contact with pets (handling pet, pet's toys, feeding ustensils, premises should be disinfected (bleach, quaternary ammonium compounds) are the preventive measures.

(L) *Brucellosis*

Brucella species are small, gram-negative, nonmotile, nonspore-forming, rod-shaped (coccobacilli) bacteria. They function as facultative intracellular parasites, causing chronic disease, which usually persists for life. *B. canis* affects dogs. The disease is characterized by epididymitis and orchitis in male dogs, endometritis, placentitis, and abortions in females, and often presents as infertility in both sexes. Manifestations are frequently nonspecific, and may include one or more of the following: fever (often periodic and nocturnal), fatigue, headache, weakness, malaise, chills, sweats, weight loss, hepatomegaly, splenomegaly, and lymphadenopathy Humans can be also infected, but occurrences are rare. Symptoms in human male may be orchitis and in female abortion may happen. The option of euthanasia of infected dog(s), If the animal is not to be euthanized, the three step process of neutering, antibiotic treatment, and repeat testing should be advised. Hygiene measures pertaining to contact with canine urine, feces, and reproductive fluids can control the brucella infection to human beings.

(M) Lyme disease

Infectious Agent is Borrelia burgdorferi- Helical shaped bacteria (spirochete), 10-25 microns in length, Gram negative, 7 – 10 periplasmic flagella, Loosely associated outer membrane which aids in motility. It is transmitted by ticks Ixodes scapularis, Northeast Ixodes pacificus. Clinical Signs in humans are erythema migrans (50% of cases), Fatigue, Fever / headache, Lymphadenopathy, Muscle / joint pain, Swollen knees (common sequellae), Carditis, Nervous tissue abnormalities, bell palsy . The prevention may control the transmission. Early removal of ticks, ticks need to feed for 24 hours before organism can be spread, Vaccination, Recombinant OSP vaccine LymeVax (Dogs),

Clean and hygienic environment will control the transmission to human beings.

(N) Rockey mountain spotted fever

Caused by *Rickettsia rickettsii* which is obligate intracellular coccobacillus, gram Negative, very small (1.2 x 0.5 microns), usually occur singly may also appear in strands. The diseases is transmitted by vector ticks *Dermacentor variabilis* (American Dog Tick), *Dermacentor andersoni* (Rocky Mountain Wood Tick). Transovarial transmission in ticks also happens. Male ticks may transmit infection to females during mating. Adults and nymph stages feed on mammals and transmit infection. Clinical Signs in humans includes fever, nausea / vomiting, Severe headache, Muscle pain, rash 2-5 days after onset of fever, abdominal pain, arthralgia diarrhea, thrombocytopenia / hyponatremia.

(O) Ehrlichiosis and Anaplasmosis

These are caused by members of the genera *Ehrlichia* and *Anaplasma*, respectively. Both genera contain small, pleomorphic, gram negative, obligate intracellular organisms, and belong to the family Anaplasmataceae, order Rickettsiales. They are classified as α-proteobacteria. A number of *Ehrlichia* and *Anaplasma* species affect animals. *Rhipicephalus sanguineus*, the brown dog tick, is the primary vector for *Ehrlichia canis*. *E. canis* can also be transmitted experimentally by *Dermacentor variabilis*, the American dog tick. *Anaplasma phagocytophilum* is transmitted by Ixodes species. In humans, the consequences of infection vary from asymptomatic infections or mild symptoms to a severe, potentially fatal illness. Clinical Ehrlichiosis and Anaplasmosis have similar symptoms, especially in the early stages; these diseases are all characterized by the acute onset of a nonspecific febrile illness, often (though not always) accompanied by thrombocytopenia, leukopenia and elevated levels of hepatic enzymes in the blood.

(P) Scabies

Scabies is a contagious disease caused by mite *Sarcoptes scabies* in dog and human. Since strains of *Sarcoptes scabies* are strictly host specific, human scabies of animal origin is usually superficial and self-limiting. The clinical and epidemiological features of canine scabies in human are history of contact with infested animal, sudden appearance of lesion, papulo-vesicular eruption with intense pruritus/itching, and absence of burrows with lesion only on exposed parts of the body.

Table-1. showing some Important Zoonoses from Canine and Feline Species

Pathogen	Transmission	Animal Disease	Human Disease
Rabies (Lyssa Virus)	animal bites	progressive neurologic dysfunction, death	progressive neurologic dysfunction, death
Pasteurella, Capnocytophaga , Staphylococcus spp.	bacterial contamination following bite wounds	asymptomatic	swelling, cellulitis, local inflammation, abscess at the site of the wound; may require systemic antibiotic treatment in severe cases
Dermatophytosis "Ringworm"	direct contact with infected animals	asymptomatic or skin lesions with alopecia, hyperkeratosis, erythema and crusts	raised circular lesions, with erythema and hyperkeratosis



Table-1 (contd.) showing some Important Zoonoses from Canine and Feline Species

Pathogen	Transmission	Animal Disease	Human Disease
Toxoplasma gondii -cats only	fecal-oral or ingestion of contaminated tissues	abortions, still births, encephalitis, myositis, birth defects, death	abortions, still births, encephalitis, myositis, birth defects, death
Bartonella henselae **"Cat Scratch Fever"**	animal bite or scratch	subclinical	lymphadenopathy, fever, malaise, encephalitis, local inflammation, abscess
Campylobacter spp.	fecal-oral	asymptomatic or diarrhea	gastroenteritis, diarrhea
Salmonella spp.	fecal-oral or ingestion of contaminated food	asymptomatic or diarrhea	gastroenteritis, diarrhea
Giardia spp.	fecal-oral, contaminated food or water sources	diarrhea	diarrhea, fever, vomiting
Toxocara spp.	accidental ingestion of embryonated eggs from environment	diarrhea	usually asymptomatic visceral or ocular larva migrans
Brucellosis	exposure to aborted fetuses, placental material, urine, or vaginal discharges	orchitis, scrotal dermatitis, generalized lymphadenopathy, abortion	intermittent fever, malaise
Leptospirosis	direct contact with infected urine	malaise, icterus, nephritis	malaise, acute nephritis, icterus, hepatitis, uveitis
Ancyclostoma spp.	direct contact with infected material	diarrhea	cutaneous larva migrans eosinophilic enteritis (A. caninum)
Ehrlichia	tick (Rhipicephalus sanguineus/ Dermacentor	thrombocytopenia, fever, lethargy, anorexia, lymphadenopathy	fever, headache, fatigue, and muscle aches
Borelia burgdorferi Lyme Disease	tick (Ixodes spp)	lymphadenopathy, arthritis, fever, anorexia, carditis, neuronal damage	Erythema migrans,fever, fatigue, joint pain, carditis
Rickettsia rickettsii	Tick (Dermacentor spp)	vomiting, diarrohea, neurological abnormality, ocular hemorrhage	Lypmhadenopathy, Thrombocytopenia, ocular haemorrage
Sarcoptes scabies	Direct contact	Sarcoptic mange	pruritus, dermatitis erythematous macules or papules on the limbs and body

Further Readings :

Bandi, K. M., and Saikumar, C., (2013), Sarcoptic Mange: A Zoonotic Ectoparasitic Skin Disease. Journal of Clinical and Diagnostic Research: JCDR, **7**(1), 156–157.

Brian Charn, Cathy Lamm, David Weber, (2003), Viral and Bacterial Zoonoses of the Dog. UCDAVIS School of Veterinary Medicine.

Ehrlichiosis and Anaplasmosis: Zoonotic Species, (2013), The centre for food security and public health, Lowa state University:1-14.

Fontaine, R.E. and Schantz, P.M., (1988), Pet ownership and knowledge of zoonotic diseases in De kalk county Georgia. Anthrozoos, **3**: 45-49.

Griego, R. D., Rosen, T., Orengo, I. F., & Wolf, J. E., (1995), Dog, cat, and human bites: a review. Journal of the American Academy of Dermatology, **33**(6), 1019-1029.

Itoh, N.; N. Muraoka, M. Aoki and T. Itagaki, (1997), Prevalence of Toxocara canis infection in household dogs. The journal of the Japanese Association for the infectious disease. **3**: 114-119.

JL Smith, (1993), Documented outbreaks of Toxoplasmosis: Transmission of Toxoplasma gondii to humans. J Food Prot, **56** : 630–639.

Kollataj, W., Milczak, A., Kollataj, B., Karwat, D.I., Sygit, M. and Sygit, K., (2012), Risk factors for the spread of parasitic

Raval HS, Nayak JB, Patel BM and Bhadesiya CM, (2015), Zoonotic importance of canine scabies and dermatophytosis in relation to knowledge level of dog owners, Veterinary World **8**(6):763-767.

Steere, A. C., Grodzicki, R. L., Kornblatt, A. N., Craft, J. E., Barbour, A. G., Burgdorfer, W. and Malawista, S. E., (1983), The spirochetal etiology of Lyme disease. New England Journal of Medicine, **308**(13), 733-740.

Robinson, R. A., & Pugh, R. N., (2002), Dogs, zoonoses and immunosuppression. The journal of the Royal Society for the Promotion of Health, **122**(2), 95-98.

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Varying trends of antibiotic resistance in West Godavari district among chronic mastitis cases

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Abstract:

In this paper, Antibiotic sensitivity results of milk samples of 38 chronic mastitic cases, which were presented to the State Institute of Animal Health (SIAH), Tanuku, were discussed. The results of the present study support the theory that upon removal of the selective pressure that is applied by the presence of antibiotics, the resistant bacterial population can potentially revert to a population of bacteria that is sensitive to antibiotics.

Keywords: Antibiotic resistance, Dairy animals, Mastitis

Introduction :

Mastitis is considered as an inflammatory reaction of the mammary gland and may be caused by infectious, traumatic and or toxic agents and characterised by physical, chemical and usually bacteriological changes in milk and pathological changes in glandular tissues. Usually bovine or bubaline mastitis is caused by bacterial infection. (Radostits *et al.*, 2007). Mastitis is the most frequent reason for antimicrobial drug use in dairy herds and as antimicrobial resistance is associated with the improper use of antimicrobial agents, it is important to monitor antimicrobial susceptibility of mastitic pathogens (Li *et al.*, 2007).

Materials and methods:

Out of total 43 dairy animals affected with mastitis and previously treated with antibiotics at local dispensaries were presented to the State institute of Animal Health (SIAH, Tanuku), the referral Veterinary polyclinic in the West Godavari district, Andhra Pradesh, milk samples of 38 cases [32 buffaloes and 6 cows] yielded bacterial cultures upon inoculation. For diagnosing mastitis, physic-chemical tests like visual inspection, California mastitis test (CMT) and detecting pH of the milk samples were employed. The modified disc diffusion method of Kirby-Bauer was employed to perform Antibiotic susceptibility testing using antibiotic test discs {Antibiotics used for screening were beta lactam antibiotics (Penicillin, amoxicillin, cloxacillin, ceftriaxone, ceftizoxime), aminoglycosides (Streptomycin, Gentamicin, Amikacin), tetracyclines (Oxytetracycline), floroquinolones (Enrofloxacin) and chloramphenicol}.

Results:

All the mastitc milk samples had shown alkaline pH and CMT score at +3 indicating clinical mastitis and high somatic cell counts. Out of the 43 milk samples, 38 samples predominantly showed bacterial cultures in Grams staining.

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Fig 1: Antibiotic sensitivity testing on Mueller-hinton agar plates

ABST results of the milk samples were given in the table no-1. Among the total 38 samples, 5 milk samples had shown resistance to all the antibiotics employed in the ABST. With regard to the therapeutic recovery, six animals didn't show improvement after treatment regimen as per ABST results.

Discussion:

Resistance to antibiotics in bacterial isolates from mastitis cases is widely reported in India and abroad (Lee, 2006, Kaliwal *et al.*, 2011,). Therefore wide spread antimicrobial resistance among mastitis pathogens, as in the present study, is not an uncommon phenomenon. There were six animals that didn't show recovery even after therapeutical management with antibiotics as per the ABST results. The reason why the results of the clinical response to therapy do not always correspond to antibiotic laboratory testing include errors in performance or interpretation of test results, imprecise definition of resistance and host factors which influence the outcome of treatment regardless of the antibiotic being used (Devriese and Dutta, 1981) and certain mastitis-causing pathogens, such as Mycoplasma, Prototheca, Nocardia, Psedomonas, and yeast are non-responsive or poorly responsive to antibiotics. The mechanisms of mutation and natural selection aid bacteria populations in becoming resistant to antibiotics. Therefore, antibiotic resistance of bacteria is not an example of evolution in action but rather variation within a bacterial kind (Purdom, 2009). If the selective pressure that is applied by the presence of an antibiotic is removed, the bacterial population can potentially revert to a population of bacteria that responds to antibiotics (Guillemot *et al.*, 2005). This was evident in the present study results with more percentage of bacterial cultures were sensitive to antibiotics like Chloramphenicol and Amikacin, which are less frequently used now.

Antimicrobial use in animal production, supported by economic considerations, can lead to introduction of the antibiotic residues into the physical environment and further support the generation of Antimicrobial resistance in the environmental biota, as well as cause the creation of food safety-related pathogens, resulting in health issues in human populations, and consequent health-related economic losses. Most antibiotics are time dependent to be administered at periodic regular intervals, so extending the duration of therapy is expected to be more effective than giving a higher dose at each treatment without extending the duration. Responsible use of broad-spectrum antibiotics such as 3rd or 4th generation cephalosporins (which are also used in human medical practice and paediatric practice) is needed, because their use may enhance emergence of wide-spectrum beta lactamase production among bacteria. Antibiotics like Chloramphenicol are still used in some rural areas, to treat diseases like Typhoid, therefore care need to be taken regarding withdrawal periods in case of food producing animals.

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Table no-1

ANTIBIOTIC	Resistant	Intermediate	Sensitive
Penicillin	37 (97.3%)	-	1 (2.63%)
Amoxicillin	28 (73.6%)	1 (2.63%)	9 (23.6%)
Cloxacillin	30 (78.9%)	2 (5.26%)	6 (15.7%)
Ceftriaxone	24 (63.15%)	2 (5.26%)	12 (31.57%)
Cefzoxime	20 (52.6%)	5 (13.1%)	13 (34.2%)
Streptomycin	27 (71.05%)	2 (5.26%)	9 (23.6%)
Gentamicin	20 (52.6%)	-	18 (47.36%)
Amikacin	16 (42.1%)	2 (5.26%)	20 (52.6%)
Oxytetracycline	17 (44.73%)	6 (15.78%)	15 (39.47%)
Enrofloxacin	20 (52.6%)	2 (5.26%)	16 (42.1%)
Chloramphenicol	15 (39.47%)	2 (5.26%)	21 (55.26%)

References:

Devriese, L. A. and Dutta, G. N., (1981), Antibiotic sensitivity testing: correlations between in vitro tests and in vivo situations. Ann. Rech. Vet. 12(1): 41-46 (Vol. 12, No. 1, pp. 41-46).

Guillemot, D., Varon, E., Bernède, C., Weber, P., Henriet, L., Simon, S., Laurent, C., Lecoeur, H. and Carbon, C., (2005), Reduction of antibiotic use in the community reduces the rate of colonization with Penicillin G—nonsusceptible Streptococcus pneumoniae. Clin. Infect. Dis. **41**(7): 930-938.

Kaliwal, B. B., Sadashiv, S. O., Kurjogi, M. M., & Sanakal, R. D., (2011), Prevalence and antimicrobial susceptibility of coagulase-negative Staphylococci isolated from bovine mastitis. Vet. World. **4**(4): 158-161.

Lee, H. J., (2006), Occurrence of methicillin resistant Staphylococcus aureus strains from cattle and chicken and analysis of their mecA, mecRI and mecI genes. Vet. Microbiol. **114**:155-159.

Li, X. Z., Mehrotra, M., Ghimire, S., & Adewoye, L., (2007), β-Lactam resistance and β-lactamases in bacteria of animal origin. Vet. Microbiol. **121**(3): 197-214.

Purdom, G., (2009), The Role of Genomic Islands, Mutation, and Displacement in the Origin of Bacterial Pathogenicity. Answers Research Journal.

Radostits, O. M., Gay, C. C., Hinchcliff, K. W. and Constable, P. D., (2007), Veterinary Medicine. A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses. 10th Ed. Elsevier Publishing Co, the Netherlands.

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Hemato-biochemical changes during guaifenesin-ketamine-xylazine and diazepam-ketamine-xylazine triple drip for gelding in equines

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Abstract:

Two different anaesthetic combinations viz. GKX (guaifenesin-ketamine-xylazine) and DKX (diazepam-ketamine-xylazine) in equines for maintenance of anaesthesia for gelding under field conditions were compared. Twenty apparently healthy horses were randomly divided equally in two groups, and were subjected to two different anaesthetic protocols group I GKX and group II DKX. The animals were evaluated on the basis of physical and hemato-biochemical changes during the study period. Hematological estimations in GKX group revealed highly significant increase in TLC values. Whereas, in DKX group TLC increased significantly during twenty four hours after recovery, it increased significantly after 30 min of induction and immediately after recovery when compared between group. A significant increase in the neutrophil count was found only in DKX group. Biochemical study revealed significantly increased blood glucose level during interval of maintenance of anaesthesia and after recovery in both the groups. The ALT was significantly higher in GKX group during maintenance of anaesthesia. The overall changes in other blood biochemical parameters viz; ALKP AST, BUN, creatinine, sodium potassium and chloride were non-significant when compared within and in between the groups at different time interval.

Key words: Triple drip, xylazine, ketamine, diazepam, guaifenesin, equines.

Introduction:

Equine anesthesia is a species-specific skill and knowledge. Horses undergo various field surgeries with an injectable anesthetic regime. The risk of mortality in equine anaesthesia is more than in other commonly anaesthetized domestic species (Johnston *et al.*, 1995 and Martinez *et al.*, 2012). With xylazine and ketamine under field anesthesia, additional boluses of these injectables are likely required for surgical maintenance.

The use of total intravenous anaesthesia (TIVA) helps in reducing variety of preanaesthetic, anaesthetic and post-anaesthetic problems such as arrhythmias, hypotension, respiratory insufficiency, motor excitement and anxiety or post-anaesthetic myopathy (Garcia *et al.*, 2002). Total intravenous anesthesia for horses has been reported to have several advantages over inhalation anesthesia, including better maintenance of cardiovascular and respiratory function and quiet coordinated recoveries. TIVA is widely used for short period of anaesthesia in

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horses, hence called "field anaesthesia". The combination of α-2 adrenergic agonist, ketamine and guaifenesin triple drip is used most widely in field conditions (Young *et al*., 1993 and Taylor *et al*., 1998). Thus, keeping in view the limitations of use of inhalation anaesthesia in field conditions, an ideal balanced anaesthetic protocol has been studied for its application. The present study was carried out to compare triple drip by using guaifenesin and diazepam in combination with xylazine-ketamine for gelding in equine under field conditions.

Materials and Methods:

The present study was conducted in horses referred to Teaching Veterinary Clinical Complex, NVC, Nagpur and in various field hospitals of the Maharashtra State. Total 20 horses presented for gelding were randomly divided into two equal groups where the anesthesia was induced with xylazine @ 1.1 mg/kg body weight and ketamine @ 2.2 mg/kg body weight in both the groups. Maintenance of anaesthesia during surgical procedure was carried out with triple drip GKX of guaifensin (25 gm), ketamine (500 mg) and xylazine (250 mg), in 500 mL normal saline solution and (DKX) diazepam (25 mg), ketamine (500 mg) and xylazine (250 mg), in 500 mL normal saline solution in group I & II, respectively and was administered @ 2.2 mg/kg/hr in both the groups.

The blood samples (2 ml) were collected in sterile vials containing EDTA at pre-induction (0 min), after induction (30 min), immediately after recovery and 24 hrs after recovery in each animal. The hematological estimations such as haemoglobin (Hb), Packed cell volume (PCV), total erythrocyte count (TEC), total leukocyte count (TLC) and differential leukocytes count (DLC) were carried out using fully automated analyzer (ABX Micros ESV 60, Horiba Pvt Ltd., New Delhi). Similarly, 2ml blood was collected in clot activator and then serum was separated for biochemical estimations viz; aspartate amino-transferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALKP), blood urea nitrogen (BUN), creatinine, sodium, potassium and chloride using Star-21 semi automatic biochemical analyzer(SEAC) with commercially available diagnostic kits. For glucose estimation 2 ml each blood samples were collected separately in a sterile vial containing fluoride oxalate as an anticoagulant. The statistical analysis was done using analysis of variance with one way classification and "t" test to compare the mean values at different intervals as well as groups with their base values in each group. Variables with $P<0.05$ were considered as statistically significant, variables with $P<0.01$ were statistically considered as highly significant and variables with $P>0.05$ were statistically considered as non significant and data were expressed as Mean±SE.

Results and Discussion:

The dosages adopted in the present study have been well documented (Kerr *et al*., 1996). Xylazine and ketamine combination is commonly used for induction and maintenance of anaesthesia in horses (Muir *et al*., 1977) whereas, the addition of guaifenesin helps to achieve desirable effects of analgesia, unconsciousness and muscle relaxation associated with general anaesthesia as mentioned by Muir *et al*., (1978). Guaifenesin and diazepam are central acting muscle relaxants which augment xylazine induced sedation (Nanda *et al*. 2014).

The mean haematological and serum biochemical values of GKX and DKX groups were given in Tables (I to IV).

Table I: Mean pre and post anaesthetic haematological values in GKX group

Parameters	Group –I (GKX)			
	Pre-induction (0 min)	After induction (30 min)	Immediately After recovery	24 Hrs. after recovery
Hb (g/dl)	11.21±0.60	10.57±0.55	10.19±0.46	11.27±0.38
PCV (%)	36.8±3.70	41.32±6.73	42.06±7.04	36.16±1.56
TEC (103/µl)	8.36±0.44	7.86±0.43	7.55±0.44	8.07±0.52
TLC (106/µl)	7.11^{b}±0.44	5.69^{b}±0.86	6.27^{b}±0.64	9.94^{a}±0.52
L (%)	36±3.04	32.7±2.79	33±2.97	32.2±2.91
E (%)	1.9±0.23	1.5±0.16	1.5±0.16	1.5±0.26
N (%)	58.6±3.36	62.2±3.10	62.2±3.16	63.1±3.40
M (%)	3.5±0.30	3.6±0.33	3.3±0.21	3.2±0.41

Significance defined in alphabets for within group and significance defined between groups using * (5%) and ** (1%)

Table II: Mean pre and post haematological values in DKX group

Parameters	Group –II (GKX)			
	Pre-induction (0 min)	After induction (30 min)	Immediately After recovery	24 Hrs. after recovery
Hb (g/dl)	12.13±0.69	11.57±0.41	10.59±0.29	12.74±0.74
PCV (%)	37.75±1.33	37.39±1.26	34.36±1.06	38.68±1.57
TEC (103/µl)	7.81±0.46	7.57±0.32	6.96±0.26	8.01±0.44
TLC (106/µl)	8.6^{b}±0.88	8.39^{b}±0.71*	8.89^{b}±0.48**	12.15^{a}±1.47
L (%)	39.6±1.02	37.6±1.0	35.4±1.33	38.3±1.25
E (%)	1.9±0.1	2±0.25	2.1±0.23	2±0.14
N (%)	54.3a±1.04	57.1ab±1.05	59.6a±1.50	57.1ab±1.18
M (%)	3.2±0.29	3.3±0.3	2.9±0.31	2.6±0.22

Significance defined in alphabets for within group and significance defined between groups using * (5%) and ** (1%)

The haematological estimations in GKX group revealed high significant increase in TLC (9.94±0.52 10^{6}/µl) values 24 hours after recovery. In DKX group TLC was increased significantly (12.15±1.4710^{6}/µl) during twenty four hours after recovery while, between the groups TLC increased significantly 8.39±0.71 10^{6}/µl and 8.89±0.48 10^{6}/µl, respectively, after

induction 30 min and immediately after recovery respectively. Increased level of TLC within the group could be due to pooling of blood cells in the spleen or other reservoirs secondary to sympathetic activity and shifting of fluid from extravascular to intravascular compartment in order to maintain normal cardiac output (Wangner *et al*., 1991). Similar results were also reported after administration of medetomidine and medetomidin- ketamine in goat (Hugar, 1993). While, non significant changes were observed in all remaining parameters throughout the period of anaesthesia and values were within the normal range.

A significant increase (P<0.05) in the neutrophil count was found only in DKX group. The neutrophila during the maintenance of anaesthesia simulating the classic stress leukogram where lymphocytopenia, eosinopenia and monocytosis were evident in DKX group.

The change in pattern of DLC in terms of leukogram was marked when the horses were induced and maintained with ketamine (Sankar *et al*. 2010 and Malik *et al*. 2011). Stress as a consequence of tissue injury either physical, chemical, surgical or due to infection would lead to a response in vascular, cellular and localized changes, which results in vasoconstriction, endothelial cell separation, diapedesis of leukocytes and fibrin plug formation in the process of inflammation (Stashak, 1991).

Table III: Mean pre and post induction Biochemical values in GKX group

Parameters	Group –I (GKX)			
	Pre-induction (0 min)	After induction (30 min)	Immediately After recovery	24 Hrs. after recovery
Glucose (mg/dl)	94.56^{c}±3.23	125.14^{ab}±10.65	150.25^{a}±11.54	112.47^{bc}±7.33
Potassium (mEq/L)	3.67±0.11	3.37±0.12	3.49±0.12	3.53±0.12
ALKP (IU/L)	347.12±14.34	343.05±19.68	364.37±32.05	450.56±50.46
ALT (IU/L)	16.96±1.29	20.16**±1.35	20.46**±1.81	18.43±1.75
AST (IU/L)	152.46±13.54	172.7±18.34	162.7±14.87	183.08±14.56
BUN (mg/dl)	23.45±1.30	22.01±1.46	21.92±1.02	20.66±1.19
Creatitine (mg/dl)	1.83±0.20	2.0±0.19	1.94±0.21	1.97±0.18
Sodium (mEq/L)	141.32±5.35	136.54±2.01	134.53±3.10	135.64±1.69
Chloride (mEq/L)	101.37±1.82	104.35±2.89	105.48±2.72	106.27±1.71

Significance defined in alphabets for within group and significance defined between groups using * (5%) and ** (1%)

Table IV: Mean Biochemical values in DKX group

Parameters	Group –II (GKX)			
	Pre-induction (0 min)	After induction (30 min)	Immediately After recovery	24 Hrs. after recovery
Glucose (mg/dl)	85.49[b]±4.50	132.15[a]±16.27	138.80[a]±9.37	96.27[b]±9.1
Potassium (mEq/L)	3.53±0.11	3.43±0.16	3.58±0.11	3.75±0.16
ALKP (IU/L)	403.2±32.10	452.12*±38.03	454.79±49.75	452.57±40.76
ALT (IU/L)	13.05±1.46	10.63±0.88	9.37±0.95	10.46±0.91
AST (IU/L)	175.84±14.91	167.27±17.64	173.15±22.01	179.36±25.38
BUN (mg/dl)	21.2±1.74	20.08±1.67	17.81±1.89	21.05±1.69
Creatitine (mg/dl)	1.76±0.09	1.86±0.12	2.13±0.17	2.03±0.13
Sodium (mEq/L)	127.65±3.96	131.78±3.21	124.86±4.38	128.67±3.75
Chloride (mEq/L)	100.74±1.24	106.56±1.73	106.72±2.58	102.39±1.31

Significance defined in alphabets for within group and significance defined between groups using * (5%) and ** (1%)

The blood glucose increased significantly ($P<0.01$) during maintenance of anaesthesia and after recovery in both GKX and DKX groups. The increase in blood glucose has been documented with a combination of xylazine, ketamine and guaifenesin by Young *et al*. (1993) and with xylazine alone by Singh *et al*., (1996). Xylazine may cause hyperglycemia at recommended doses (Steffey, 1980 and; Reves and Knopes, 1989) as it inhibits insulin released by stimulating alpha-2 adrenoceptors in pancreatic beta cells (Thurmon, 1982) and there is insulin rebound effect after xylazine induced hyperglycemia. Also, the stress associated with the anaesthetic is believed to stimulate the hypothalamus and pituitary, which contributes to hyperglycemia by increasing secretion of ACTH (Dikshit and Prasad, 1971).

Whereas, no significant change in ALKP was observed in between the group but during maintenance of anaesthesia there was significant increase within group 30 min after induction in DKX group. Since, the range of ALKP values in horses is wide that a change in its value is of no clinical relevance. The ALT increased non significantly in GKX group and returned near to baseline values after 24 hours whereas, in DKX group ALT decreased non significantly. The ALT was significantly higher in GKX group during maintenance of anaesthesia. The increase in ALT in group I could be due to altered permeability of plasma membranes and/or cellular damage (Drotman and Lawhorn, 1978) but they are not organ specific. The elevation of transaminase has been reported during anaesthesia and surgery (Clarke *et al*., 1976). The alterations in the plasma level of the enzymes can also be related to the surgical trauma. In the present study, overall non significant changes in the rest of the biochemical parameters viz; AST, BUN, creatinine, sodium, potassium and chloride were noticed in both the groups.

Conclusion:

The result of hemato-biochemical study suggested that neither of the drug combinations of GKX and DKX produced any adverse effect on the vital organs of the body and both the groups combinations are acceptable for maintenance of anaesthesia in horses for gelding up to 30 minutes duration under field conditions.

References:

Clarke R.S.J., J.R. Doggart, and T. Lavery, (1976), Changes in liver function after different types of surgery. British J. Anaesth. **48**:119-128.

Dikshit, V. C. and J. Prasad, (1971), The influence of surgical trauma on blood glucose levels during anaesthesia. Indian J. Anaesth. **19**: 111.

Drotman R. B. and G.T. Lawhorn, (1978), Serum enzymes as indicator of chemically induced liver damage. Drug Chem. Toxicol. **1**:163-171.

Garcia A.A., H. Sumano, and E. Nunez, (2002), Pharmacological basis of short term intravenous general anaesthesia in the equines. Veterinaria Mexico. **33**(3):309-333.

Hugar B., (1993), Studies on medetomidine as a preanaesthetic to ketamine anaesthesia in goats. MVSc thesis submitted to Deemed University, IVRI, Izatnagar (UP), India.

Johnston G.M., P. M. Taylor and M. A. Holmes, (1995), Confidential enquiry of perioperative equine fatalities (CEPEF-1): preliminary results. Equine Vet J. **27**:193-200.

Kerr, C. L.; McDonell, W. N. and Young, S. S., (1996), A comparison of romifidine and xylazine when used with diazepam / ketamine for short duration anesthesia in the horse. Can. Vet. J., Vol. **73**: 601-609.

Malik V., P. Kinjavdekar, Amarpal, H.P. Aithal, A.M. Pawde and Surbhi, (2011), Electrocardiographic and haematobiochemical changes during continuous intravenous infusion anaesthesia with ketamine in medetomidine or midazolam premedicated buffaloes. Indian J. Vet. Surg. **32**: 9-13.

Martinez E.A., A.E. Wagner and B. Driessen, (2012), American College of Veterinary Anesthesiologists guidelines for anesthesia in horses. Available at http://www.acva.org/docs/Equine.

Muir W.W., R.T. Skarda and D.W. Milne, (1977), Evaluation of xylazine and ketamine hydrochloride for anesthesia in horses. Am J Vet Res. **38**(2):195-201.

Muir W.W., R.T. Skarda and W. Sheehan, (1978), Evaluation of xylazine, guaifenesin, and ketamine hydrochloride for restraint in horses. Am J Vet Res. **39**(8):1274-8.

Nanda V.S., A. Kumar, M.S. Kanwar, A. Sharma, S.K. Sharma and A. Khurana, (2014), Continuous maintenance anaesthesia using guaifenesin or diazepam combined with xylazine and ketamine in horses. Indian J. Vet. Surg. **35**(2): 89-92.

Reves J.G. and K.D. Knopes, (1989), Adrenergic components of the stress response. Anesth. Report **1**:175-191.

Sankar P, B. Justin William, G.D. Rao, S. Prathaban, R. Suresh kumar and V. Leela, (2010), Oxidative stress response during surgery under ketamine/propofol anaesthesia in acepromazine-xylazine premedicated horses. Indian J. Anim. Res. Vol. **44** (2):113-117.

Singh M., V. Kumar, A.C. Varshney, S.K. Sharma and J.M. Nigam, (1996), Clinico-biochemical effect of xylazine administration in Spiti ponies. Centaur **13**: 21-23.

Stashak, T.S., (1991), Inflammatory process and wound management. In: Equine Wound Management. Lea and Febiger, 2nd edn Iowa State University Press. U.S. pp. 21.

Steffey E.P., (1980), Alterations in the horse blood cell count and biochemical values after halothane anaesthesia. Am. J. Vet. Res. **41**: 934-939.

Taylor, P.M., J.J. Kirby, D.J. Shrimpton, and C.B. Johnson, (1998), Cardiovascular effects of surgical castration during anaesthesia maintained with halothane or infusion of detomidine, ketamine and guaifenesin in ponies. Equine Vet. J. **30**: 304-309.

Thurmon J.C., (1982), Xylazine hydrochloride induced hyperglycemia and hypoinsulinemia in thorough bred horses. J. Vet. Pharmacol Therap. **5**: 242-245.

Wagner A.E., W.W. Muir and K.W. Hinchcliff, (1991), Cardiovascular effects of xylazine and detomidine in horses. Am. J. Vet. Res. **52**: 651-657.

Young L.E., D.H. Bartram, M.J. Diamond, A.S. Gregg and R.S. Jones, (1993), Clinical evaluation of an infusion of xylazine, guaifenesin and ketamine for maintenance of anaesthesia in horses. Equine Vet. J. **25**:115-119.

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Effect of cooling treatment on physiological responses and milk production in buffaloes during hot and dry season.

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Abstract :

Effect of different cooling treatments for alleviation of heat stress, 24 buffaloes were selected from Institute´s herd. These were divided into four groups of six each. Buffaloes of Treatment group 1 were given no cooling treatment and treated as control group, while buffaloes of Treatment group 2,3 & 4 were given treatments as splashing of water at hourly interval between from 11.00 A.M. to 4.00 P.M., application of wet gunny bags on body surface and wetted at hourly interval between from 11.00 A.M. to 4.00 P.M., provision of wet curtains around shed and curtains are wetted at hourly interval between from 11.00 A.M. to 4.00 P.M, respectively, for experimental period of 60 days. Physiological responses viz. rectal temperature, respiration rate and pulse rate were recorded in the morning 7.30 A.M., in afternoon 2.30 P.M. and in evening at 6.30 P.M. The experimental was conducted during hot and dry season when average maximum temperature was 43.00°c (42.5-47.4°c) and relative humidity was 20% (range) .Milk yield increased ($p<0.005$) by 0…in group II, by 0… in group III, by 0.0. in group IV in comparison to control. Average rectal temperature was less by 0.54°cin group II, by 0.27°c in group III, by 0.11°c in group IV as compared to control group. The values of physiological responses for rectal temperature, respiration rate and pulse rate were different in morning, noon and evening. Polled value for average rectal temperature for noon was 38.44±0.08 more than evening 38.26±0.08 followed by morning 37.66±0.01, same trend followed for respiration rate with polled value for average respiration rate for noon was 28.98±0.27 more than evening 24.81±0.09 followed by morning 19.47±0.10. Polled value for average pulse rate for noon was 56.75±0.16 higher than morning 52.84±0.07 followed by evening 52.32±0.30. The study indicated that cooling treatments significantly influence the physiological responses and increases milk yield during hot and dry season.

Keywords: physiological responses, milk yield, cooling treatments, hot and dry season

Introduction :

India is a tropical country where climatic variation is extreme, of country during the summer temperature goes up to as high as 45 to 47^{0}C. This high ambient temperature creates stress which reflects in decreased feed intake and milk yield and on the general health of animal. Animals rests under shade and shows an intense desire for wallowing or swimming on account of its poor sweating ability.

Buffalo is hardier and has a better resistance to diseases but is susceptible to the stress of long durations of heat radiation of the sub-tropics and tropics. It is very sensitive to high ambient

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temperature and direct expose to sun.

The water buffalo body temperature of buffalo is normally lower than that of cattle which may account for their lower heat tolerance coefficient. It has been reported that Egyptian buffaloes are less resistant compared to other animals. The heat tolerance coefficient for buffalo was 75.7 percent according to Rhoad's formula. The low figure for heat tolerance coefficient in buffalo was due to their large size, dark body color and small number of sweat glands.

The present study was undertaken to compare differential effect of cooling treatments on 1) physiological responses viz. rectal temperature, respiration rate and pulse rate 2) milk yield during hot and dry season in buffaloes.

Material and Methods :

Twenty-four buffaloes more or less in same lactation period were selected so as to form homogeneous group from the Institute`s herd. All the buffaloes were provided with green maize fodder and water to drink. The concentrate was offered based on milk production @ 1.0 kg/ 2.5 kg milk yield during morning (6.A.M.) and evening (6.P.M.) milking. The experiment was conducted for 60 days during April-June. The animals were divided into four groups of six each. Buffaloes of group I were given no cooling treatment and treated as control group, while buffaloes of group II, group III and group IV were given treatments as splashing of water at hourly interval for fifteen minutes between from 11.00 A.M. to 4.00 P.M., application of wet gunny bags on body surface and wetted at hourly interval between from 11.00 A.M. to 4.00 P.M., provision of wet curtains around shed and curtains are wetted at hourly interval between from 11.00 A.M. to 4.00 P.M, respectively. Buffaloes were handmilked in morning and evening, milk was recorded in kg with electronic balance and records were kept daily.

Physiological responses viz. rectal temperature, respiration rate and pulse rate were recorded in the morning 7.30 A.M., in afternoon 2.30 P.M. and in evening at 6.30 P.M. Respiration rate was determined by flank movement, pulse rate on coccygeal artery and rectal temperature by using veterinary clinical thermometer.

Data was analyzed with completely randomized design with factorial experiments. The data were analyzed by stander statistical methods of analysis described by Snedecor and Cochran (1967).

Result and Discussion :

It is evident from table that milk yield for 1st four weeks with treatment groups differ non significantly whereas from fifth week onward milk yield differ significantly within treatment groups. From the 5^{th} week onward upto 9^{th} week the animal of T_1 group produced significantly higher milk than T_2 group followed by T_3 & Control. The results indicated superiority of plashing over gunny bags & wet curtains. The increased milk in treatment groups as compared to control group indicates the benefits of cooling treatment in production of animal. It is clear from the results that when the animals relived from heat stress exhibit more production . It is also revealed that the animal require continuous cooling as indicated by results that at within treatment was non significant where with advancement of treatment the difference within the treatment were significant.

Table 1 : Average weekly milk yield of buffaloes under experimentation

Group	Weekly averages								
	1	2	3	4	5	6	7	8	9
c	5.03±0.01	4.77±0.02	4.49±0.02	4.28±0.02	4.43±0.02	4.07±0.02	3.77±0.01	3.71±0.02	3.81±0.02
T1	5.80±0.02	5.59±0.01	5.65±0.01	5.59±0.02	5.85±0.02	5.65±0.02	5.65±0.02	5.64±0.02	5.58±0.02
T2	5.53±0.01	5.59±0.01	4.89±0.01	4.65±0.03	4.73±0.03	4.70±0.02	4.55±0.02	4.38±0.02	4.25±0.01
T3	5.21±0.01	5.01±0.01	4.69±0.02	4.44±0.02	4.60±0.02	4.51±0.02	4.31±0.01	4.11±0.03	3.98±0.01
CD	N.S.	N.S.	N.S.	N.S.	0.94	1.00	0.94	0.93	0.91

Analysis of variance

It is evident from table 2 that respiration rate within treatment differ significantly when compared by least significant difference upto the 3rd week respiration rate of control group was significantly higher than T_3 group followed by T_2 & T_1. From 4th week trend has changed & significant higher respiration rate was found in control group than T_2 group followed T_3 & T_1. The same trend was observed in pooled analysis. This indicates superiority of application of splashing of water on the animal body as compared to application of wet certain or application of wet gunny as far as respiration rate of buffalo is concerned.

It is reveled from table 3 that respiration rate during morning hours was significantly lower as compared to evening hours whereas that at evening hour was significantly lowered by afternoon hours when compared by least significant difference for all weeks & pooled.

The increased respiration rate during afternoon hours might be attributed to increased thermal stress of the summer during afternoon. The lowered value for evening attributed to combined effect of temperature & humidity where as during morning as the animal was in comfort zone exhibited lowered respiration rate . Pooled value for respiration rate was 24.42±1.91. Range for RR from as low as 16 to high up to 29.

It is evident from table 4.1 that pulse rate within treatment group differ significantly for all the weeks when compared by least significant difference. Pulse rate of control group was significantly higher than T_3 group followed by T_2 and T_1 group. The same Trend was indicate superiority of splashing treatment over gunny bag & wet certain. The average pulse rate found to be 53.97±1.36. The pulse rate range from 51 to 57.

It is reveled from table 4.2 pulse rate within time differ significant for all the weeks when compared by least significant difference. The pulse rate of afternoon hours was significantly higher than evening followed morning for 1st two week. Whereas from 3rd week on ward the pulse rate of buffaloes during morning hour was significantly higher than evening. The higher pulse rate during afternoon hours might be attributed to thermal stress on the animals whereas drop in pulse rate in the evening with

advancement of treatment might be attributed to the beneficial effect of treatment on pulse rate of buffalo

It is evident from table 5 that rectal temperature within treatment group differ significantly for all the weeks when compared by least significant difference . Rectal temperature of control group was significantly higher than T_3 group followed T_2 & T_1 . The same trend was followed for the pooled average . The result indicates superiority of splashing treatment over guuny bags & wet curtains. The average rectal temp. found to be 38.12±0.13. The rectal temperature range from 37.59 to 38.69.

It is evident from table 6 that rectal temperature within time differ significantly for all the week when compared by least significant difference . The rectal temperature during afternoon hours was significantly higher as compared to evening hours whereas rectal temperature of evening significantly higher as compared to morning for all the weeks & pooled average. The record indicates the increased thermal stress on animal during afternoon hours as compared to evening hours followed by morning hours. This indicate the need of provision of cooling treatment was more during afternoon hours on wards.

Table 2: Average respiration rate within treatment

Group	Weekly averages									
	1	2	3	4	5	6	7	8	9	Pooled
c	27.29±4.64	27.39±4.62	28.30±4.98	28.74±4.92	28.75±4.92	28.74±5.05	29.88±5.66	31.02±6.61	31.03±6.63	29.09±0.45
T1	21.93±1.83	21.80±1.67	22.23±1.64	22.02±1.65	22.08±1.69	22.00±1.61	21.78±1.53	21.63±1.46	21.66±1.47	21.90±0.06
T2	22.45±1.68	22.42±1.62	22.92±1.75	23.33±1.76	23.31±1.75	23.37±1.85	23..64±1.59	24.02±1.55	23.85±1.53	23.26±0.18
T3	24.14±2.65	24.20±2.72	23.58±2.36	23.08±2.18	22.88±2.17	23.11±2.22	23.27±2.46	23.69±2.64	23.66±2.58	23.52±0.15
Pooled	23.96±1.41	23.96±1.40	24.26±1.47	24.29±1.48	24.26±1.48	24.30±1.51	24.64±1.68	25.09±1.91	25.05±1.91	24.42±1.81
CD	0.044	0.042	0.041	0.042	0.038	0.035	0.044	0.033	0.028	

Table 3 Average respiration rate within time of observation

Time	Weekly averages									
	1	2	3	4	5	6	7	8	9	Pooled
Morning	18.92±0.21	18.98±0.18	19.38±0.16	19.65±0.21	19.61±0.25	19.57±0.15	19.68±0.41	19.76±0.47	19.72±0.44	19.47±0.10
Noon	28.09±2.44	28.00±2.54	28.61±2.82	28.74±2.83	28.71±2.84	28.83±2.86	29.38±3.54	30.29±4.30	30.20±4.33	28.98±0.27
Evening	24.86±1.14	24.88±1.16	24.78±1.22	24.47±1.56	24.45±1.55	24.51±1.58	24.87±1.66	25.23±1.73	25.23±1.72	24.81±0.09
Pooled	23.96±1.41	23.96±1.40	24.26±1.47	24.29±1.48	24.26±1.48	24.30±1.51	24.64±1.68	25.09±1.91	25.05±1.91	24.42±2.75
cd	0.038	0.036	0.036	0.037	0.032	0.030	0.038	0.028	0.024	

Table 4.1 Average pulse rate within treatment

Group	Weekly averages									
	1	2	3	4	5	6	7	8	9	Pooled
c	58.03±3.08	57.98±3.09	57.13±2.22	56.86±2.02	57.11±2.12	57.02±2.05	56.40±1.92	55.42±1.35	55.34±1.26	56.81±0.31
T1	51.04±0.56	50.89±0.39	51.54±1.83	51.35±2.05	51.84±1.95	51.36±2.06	51.65±2.01	51.01±2.30	51.01±2.31	51.30±0.11
T2	53.99±1.52	54.01±1.50	52.76±2.04	52.56±2.17	52.5±2.18	52.34±2.32	52.80±1.62	53.03±1.12	53.06±1.13	53.01±0.20
T3	54.89±1.45	55.02±1.51	54.96±1.08	55.03±1.07	54.96±0.98	55.06±0.95	54.72±1.01	54.06±1.12	54.15±1.03	54.76±1.36
Pooled	54.49±1.10	54.48±1.11	54.10±1.01	53.95±1.03	54.10±1.01	53.95±1.06	53.89±0.90	53.38±0.82	53.39±0.80	53.97±1.36
CD	0.72	0.62	0.75	0.85	0.77	0.75	0.67	0.74	0.74	

4.2 Average pulse rate within time of observations

Time	Weekly averages									
	1	2	3	4	5	6	7	8	9	Pooled
Morning	52.51±0.65	52.47±0.64	52.94±0.44	52.99±0.44	53.00±0.41	53.05±0.46	52.88±0.49	52.85±0.64	52.88±0.63	52.84±0.07
Noon	57.20±2.04	57.11±2.15	57.01±1.20	56.90±1.08	57.07±1.10	56.86±1.12	56.70±0.96	55.95±0.68	55.91±0.62	56.75±0.16
Evening	53.76±2.18	53.85±2.16	52.34±2.33	51.97±2.40	52.23±2.35	51.92±2.53	52.10±1.94	51.34±1.69	51.39±1.69	52.32±0.30
Pooled	54.49±1.10	54.48±1.11	54.10±1.01	53.95±1.03	54.10±1.01	53.95±1.06	53.89±0.90	53.38±0.82	53.39±0.80	53.97±1.39
cd	0.62	0.54	0.65	0.74	0.67	0.65	0.58	0.64	0.64	53.97±1.39

* significant at 5 percent level

Table 5. Average rectal temperature within treatment

Time	Weekly averages									
	1	2	3	4	5	6	7	8	9	Pooled
Morning	37.67±0.11	37.68±0.10	37.68±0.03	37.68±0.04	37.67±0.04	37.67±0.04	37.68±0.03	37.59±0.08	37.61±0.06	37.66±0.01
Noon	38.24±0.34	38.24±0.34	38.64±0.17	38.69±0.14	38.65±0.12	38.71±0.14	38.58±0.18	38.12±0.20	38.09±0.21	38.44±0.08
Evening	38.08±0.28	38.11±0.26	38.44±0.21	38.50±0.20	38.52±0.18	38.52±0.19	38.38±0.19	37.92±0.17	37.92±0.19	38.26±0.08
Pooled	37.99±0.15	38.01±0.15	38.25±0.15	38.29±0.15	38.28±0.14	38.30±0.15	38.21±0.14	37.87±0.10	37.87±0.10	38.12±0.23
cd	0.038	0.036	0.71	0.037	0.032	0.030	0.038	0.028	0.024	

Table 6. Average rectal temperature within time of observations

Time	Weekly averages									
	1	2	3	4	5	6	7	8	9	Pooled
C	38.62±0.39	38.62±0.39	38.57±0.41	38.55±0.41	38.52±0.39	38.55±0.42	38.51±0.38	37.61±0.08	37.61±0.06	38.35±o.14
T1	37.48±0.05	37.52±0.04	37.98±0.16	38.08±0.18	38.07±0.17	38.07±0.18	37.88±0.14	37.61±0.08	37.61±0.06	37.81±0.08
T2	37.88±0.04	37.90±0.03	38.12±0.26	38.16±0.29	38.17±0.30	38.19±0.31	38.14±0.27	38.07±0.24	38.09±0.25	38.08±0.03
T3	38.00±0.20	38.00±0.20	38.34±0.35	38.38±0.38	38.37±0.37	38.40±0.38	38.31±0.30	38.20±0.20	38.19±0.20	38.24±0.05
Pooled	37.99±0.15	38.01±0.15	38.25±0.15	38.29±0.15	38.28±0.14	38.30±0.15	38.21±0.14	37.87±0.10	37.87±0.10	38.12±0.13
cd	0.044	0.042	0.041	0.042	0.038	0.035	0.044	0.033	0.028	

Analysis of variance

Sethi et al. (1991), Aggrawal & Singh (2006), Devinder Kumar and Gupta (1991), Patel et al. (1994),Sastry et al.(1973), Singh & Upadhayay (2008), Sethi et al.(1994) and Seath and Miller (1948) observed the significant effect of various cooling treatment an physiological responses of animal. The results obtained in the present investigation or in close conformity with previous reports indicative of significance of cooling treatment for comfort of the animal inside the Shed. The effect of time on physiological responses were found significant in the experiment of Sethi et al. (1994), Aggrawal & Singh (2006) & Sinha and Minnet (1947) . These observation are in agreements with the reports of present investigation. More care of the animal to be observed during the later part of the day, as pointed out by different researchers, is recommended in buffaloes. A like the effect of cooling treatment & and time on physiological responses which are indicates of the animals comfort milk yield also significantly influenced as mentioned by Sinha & Minett (1947).

Summery and Conclusion

Effect of body cooling by splashing of water, provision of wet gunny bags and wet curtain around the shed during summer on physiological performance and metrological parameters was studied for nine weeks. Twenty four buffaloes were divided into four blocks of six buffaloes in each treatment comprising of treatment one (T_1) (splashing of water), T_2 (provision of wet gunny bags) and T_3 (provision of wet curtains around the shed). One similar group acted as control.

The pooled respiration rate was higher in control (29.09±0.45) than T_3 (23.53 ± 0.15) than T_2 (23.26 ± 0.18) followed by T_1 (21.90 ± 0.06). Pooled pulse rate was highest in control (56.81 ± 0.31) than T_3 (54.76±1.36) than T_2 (53.01 ±0.20) followed by T_1 (53.3 ± 0.11) . The pooled rectal temperature was highest in control (38.35 ±0.14) than T_3 (38.24± 0.05) than T_2 (38.08 ±0.03) followed by T_1 (37.81 ± 0.08). The pooled milk yield per day highest in T_1 (5.67 ±0.03) than T_2 (4.81 ± 0.15) than T_3 (4.54 ±0.13) followed by control (4.28 ± 0.15). Splashing of

water on milch buffaloes, provision of wet gunny bags or vet curtains around the shed during the hot part of the day in summer increase comfort buffaloes. The fall in milk yield during summer can be taken care by cooling treatments.

References

Aggarwal A. and Singh M. (2006). Effect of water cooling on physiological responses, milk production and composition of Murrah buffalos during hot-humid season. Indian J. Dairy Sci. **59**:386-389.

Balkrishnan, M & Nagarcenkar, R. 1988. Effect of cooling by spraying water, wallowing and mad plaster on buffalo during summer. Proceed. Of 2nd World Buffalo Congress, India,12-16 Dec.1988.

Bempong I.A. and Gupta L.R. (1986). Effect of shelter and sprinkling on production of lactating crossbred cows during summer. Indian J. Anim. Prod. Mgmt. **2(1)**:16-19.

Narayan U., Singh D.V. and Sharma R.J. (2008). Milk production performance of lactating Holstein Friesian crossbred cows under summer stress ameliorating measures. Indian J. Dairy Sci. **61(2)**:157-160.

Sastry N.S.R., Thomas C.K., Tripathi V.N., Pal R.N. and Gupta L.R. (1973). Effect of shelter and water sprinkling during summer and autumn on some physiological reactions of Murrah buffalos heifers. Indian J. Anim. Sci. **43(2)**:95-99.

Radadia, N.S. ; Sastry, N.S.R.; R.N. AND Juneja, I J. (1980). Effect of some summer management practices on lactating Murraha buffaloes 1. feed & water intake 2.physiological reaction & attributes of blood. Hariyana Agril. Univ.J.Res. **10**:144-149

Thiremngan and saseendran (2006): Effect of housing systems and sprinkling water on production and reproduction performance of crossbred dairy cow. Journal of cow science Vol.2 Issue 2.

Singh ,M. And Mehla, R. K .1999. Crossbreed Cows: Hoe To Improve Milk Yields . Agriculture And Industry Survey:34-35

Vijay kumar & R.S. Yadav (1996). Influnce of special management practices on water intake & physiological reaction in Murraha buffaloes. Indian J. Anim. Prod. Mgmt. **12 (3,4)**:177- 180.

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Clinical Response to Different Therapies in Diarrhoeic Pre-weaned Murrah Buffalo Calves

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Abstract :

In the present investigation, the diarrhoeic Murrah buffalo calves exhibited anorexia, lethargy, dullness, depression and a moderate degree of tissue dehydration and faecal consistency watery to pasty, with mucus and foul odour. Statistically significant ($P<0.05$) decline in the rectal temperature (^0F) was observed on day 0 (pre-treatment). Treatment of antibiotic combination, Ofloxacin + Ornidazole: @ 20 mg bid, PO for 5 days closely followed by (dried ethanol extract of *Punica granatum,* @ 10g OD, PO for 7 days, showed higher response against Anonna squamosa.

Key words: Calf diarrhoea, clinical profile, remedial therapies, combination antibiotics, pomgrenatebn

Introduction :

In veterinary medical parlance, diarrhoea is a complex pathoclinical episode, characterized by increased frequency, fluidity or volume of faecal excretion with the associated serious fluid, electrolyte and acid-base imbalance. Diarrhoea in pre-weaned calves is one of the most important causes of calf morbidity and mortality in all geo-climatic regions of the world. Calf diarrhoea with adverse effects on the immediate health status, longevity in the herd and productive performance inflicts huge cumulative economic losses to the dairy industry in India and has gained added pertinence in the context of the Operation White Revolution Part II.

Bacteria, viruses and/or gastro-intestinal parasites, usually acting in concert, induce diarrhoea in calves. It is, therefore, imperative to identify the aetiological and predisposing factors to devise effective preventive measures and reduce the loss of precious calves. In the Indian traditional system of medicine, Punica granatum (common name pomegranate, Hindi "anar") bark and rind of the fruit are used in the treatment of dysentery and diarrhoea. Methanol extract of the seed and dried peels exhibits anti-diarrhoeal activity. Antimicrobial activity of methanol leaf extracts of *Annona squamosa* (common name custard apple or sugar apple, Hindi "sitaphal') against the bacteria, *Bacillus subtilis* (Gram +ve), Escherichia coli and *Serratia marcurs* (Gram -ve) is now well-established. The present communication aims to document the comparative efficacy of the fruit peel ethanolic extract of *P. granatum* (Jasim *et al.,* 2014), and the methanolic leaf extract of A. squamosa (Godhami *et al.*, 2014) taking the proven Ofloxacin and Ornidazole antibiotic combination (Oflokind-OZ^R) as the reference standard in restoration of the normal clinical profile in diarrhoeic pre-weaned buffalo calves.

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Materials and Methods :

The work was conducted in three organized dairy farms near Jabalpur, (M.P.).The age, breed, sex, history of de-worming and feeding habits of the calves were systematically recorded. Total 200 pre-weaned Murrah buffalo calves (up to 12 weeks post-partum) from the different dairy units, exhibiting characteristic signs of poor body condition, debility, rough hair coat, dry muzzle were systematically screened to evaluate their clinical status.

Clinical examination: All the affected calves were clinically examined for rectal temperature (^{0}F), pulse rate (beats/ min.), respiration (breaths/min.) and validated dehydration score, skin-fold test. The body weight (kg) was recorded, faecal consistency (pasty, semi-liquid, watery, normal), colour (yellowish, white to green) and odour (foul smelling, normal) was noted. The tissue dehydration score (mild, moderate and severe) in each calf was recorded on day 0 (pre-treatment), and on day 3 and 5 (post- treatment), according to the procedures outlined by Radostits *et al.* (2017).

The data were analyzed with Hierarchial model for Analysis of Variance, and the mean values were compared with Duncan's Multiple range test (Snedecor and Cochran, 1994).

Table 1. Faecal consistency and related Dehydration score

Score	Faecal consistency	Dehydration score
0	Normal	Normal
1	Pasty faeces	Mild dehydration, skin tent <3 sec.
2	Semi liquid faeces	Moderate dehydration, skin tent >3 sec.
3	Watery Faeces	Severe dehydration, skin tent >8 sec.

Preparation of the herbal medicaments:

The fully matured fresh leaves of *Annona squamosa* were obtained from the field and the local market in Jabalpur, (M.P.), and the plant material was identified and authenticated in the Department of Botany, Jawaharlal Nehru Krishi Vishwa Vidhyalaya, Adhartal, Jabalpur. The leaves were washed thoroughly with tap water, followed with sterilized distilled water, dried in the shade for 5-6 days and then powered with the help of a stainless steel high capacity electric blender. The dried leaf powder of *Annona squamosa* was extracted with methanol; 100 ml of the solvent was mixed with 10 g dried leaf powder and kept in the mechanical shaker for 48 hr at room temperature (RT). Extracts were separated using large neutral glass funnels containing cones of wetted Watmann filter paper No. 1. Extracts were concentrated in rotary evaporator and allowed to dry in the RT. All the extracts were coded and stored in the refrigerator (4°C) till use. The extracted powder was uniformly dissolved in 10% dimethyl sulfoxide (DMSO) sol. for medicinal use.

The peels of pomegranate fruits *(Punica granatum)*, purchased from the local fruit market, were manually removed, sun-dried and powdered. Powder (50 g) was extracted after mixing with 250 ml of water at RT for 24 hr with a magnetic stirrer. The extract was filtered through Watmann No. 41 filter paper. The clear residue

(11.8 g) was mixed with 150 ml of 70% ethanol and filtered through Watmann No.31 filter paper. The aliquots were pooled and concentrated under vacuum (6^{0}C) with a rotary evaporator, and the concentrate was powdered. The dry powder (0.5 g) was dissolved in 50 ml of 70% ethanol and mixed with 25 ml ethyl acetate. The fruit peel extract was filtered with fresh Watmann No.1 filter paper cone, and left to dry with two distinct layers of phenolic compound (Jasim *et al.*, 2014).

Total 200 pre-weaned Murrah buffalo calves, of either sex, from the Institute's Instructional Livestock Farm Complex (ILFC), Adhartal, and two representative peri-urban organized private dairy farms in Jabalpur, M.P. were screened for diarrhoea. Total 24 diarrhoeic buffalo calves were randomly divided into four treatment groups T_1, T_2, T_3 and T_4, each comprising 6 animals. Six healthy buffalo calves of the same age group were kept as the control group T_c (Table 2).

Table 2. Experimental design for evaluating the comparative efficacy of different remedial therapies

Group	No. of buffalo calves	Treatment
Tc	6	Healthy (non-diarrhoeic) Control group calves of comparable age
T_1	6	*Ofloxacin + **Ornidazole (combination) @ 20mg bid, PO for 5 days
T_2	6	Methanol extract of leaves of *A. squamosa* (custard apple) @ 25g OD, PO for 7 days
T_3	6	Ethanol extract of of *P. granatum* (pomegranate) fruit peel @ 10g OD, PO for 7 days
T_4	6	Methanol extract of *A. squamosa* leaves @ 12.5g od, PO for 7 days + Ethanol extract of P. granatum fruit peel @ 5g od, PO for 7 days

*Ofloxacin: 10mg/ kg b. wt. **Ornidazole: 20mg/kg b. wt.
Note-Fluid therapy/ Ringer's lactate sol. were used in all 4 treatments, according to the dehydration status

Results and Discussion :

In general, colostrum was fed to 0-3 day post-partum calves, approximately at the rate of 10% of their body weight. From day 4 to 1 month of age, transition milk too was fed at the same rate. In the 1-2 month and 2-3 months age groups, udder milk was offered, respectively at the rate of 20% and 5% of the b. wt. The normal de-worming protocol was routinely observed. On-farm physical examination of the diarrhoeic buffalo calves revealed anorexia, lethargy, dullness, depression and a moderate degree of tissue dehydration. Some of them revealed sunken eyes and congested visible mucous membranes. The faecal discharge, varying in consistency from watery to pasty, and sometimes admixed with mucus emitted a foul odour. The colour, generally yellowish or dirty white, was occasionally green. Analysis of the data (Table 3) revealed significant ($p<0.05$) decline in the RT on day 0 (pre-treatment). However, all four treatments, T_1-T_4 resulted in a significant ($p<0.05$) recovery towards restoration within the near normal range on day 3 (post-treatment). The values remained within the physiological range on day 5 (post-treatment), indicating continued positive therapeutic response.

Table 3. Rectal temperature (°F) in the buffalo calves of different treatment groups at varying intervals

Groups	Treatment intervals (day)			Overall
	0	3	5	
T_c	101.30^{aA}±0.32	101.57^{aA}±0.19	100.93^{bA}±0.39	101.27^{a}±0.18
T_1	98.83^{bB}±0.21	101.71^{aA}±0.06	101.83^{abA}±0.13	100.79^{ab}±0.34
T_2	98.63^{bB}±0.15	101.48^{aA}±0.21	101.98^{aA}±0.11	100.70^{ab}±0.36
T_3	98.85^{bB}±0.26	101.33^{abA}±0.09	101.96^{aA}±0.08	100.71^{ab}±0.33
T_4	99.30^{bB}±0.30	100.46^{bA}±0.09	101.30^{bA}±0.15	100.35^{a}±0.22

Mean values between the treatments (lower case) and between the intervals (upper case) with different superscripts varied significantly (p<0.05)

Analysis of the data (Table 4) revealed a significant increase in pulse rate (pulse/ minute) of the diarrhoeic calves on day 0 (pre-treatment). Increases in pulse rate in all the treatment groups on day 0 (pre-treatment) were significant (p<0.05) in treatment groups, T_3 and T_2. In general, all four treatments, T_1-T_4 resulted in significant (p<0.05) decreases in the value towards restoration of the pulse rate within the normal range on day 3 (post-treatment), except T_2. The values of pulse rate continued to remain within the normal range on day 5 (post-treatment). In all the four treatment groups, the positive therapeutic response persisted on day 5 (post-treatment), and the pulse rate was within the physiological range. This is a noteworthy on-field clinical observation.

Table 4. Pulse rate (pulse/ minute) in the buffalo calves of different treatment groups at varying intervals

Groups	Treatment intervals (day)			Overall
	0	3	5	
T_c	110.83^{cA}±0.66	111.33^{bcA}±0.61	111.16^{abA}±0.60	111.11^{c}±0.33
T_1	115.50^{bA}±0.42	109.33^{cB}±0.33	108.33^{cB}±0.33	111.05^{c}±0.73
T_2	118.00^{aA}±0.36	116.00^{aA}±0.36	113.00^{aB}±0.36	115.66^{a}±0.53
T_3	118.00^{aA}±0.36	110.00^{cB}±0.36	109.50^{bcB}±0.49	112.50^{b}±0.97
T_4	114.16^{bA}±0.30	113.16^{bAB}±0.30	111.16^{abB}±0.30	112.83^{b}±0.34

Mean values between the treatments (lower case) and between the intervals (upper case) with different superscripts varied significantly (p<0.05)

The respiratory rate (breaths/minute) had increased in all the diarrhoeic calves on day 0 (pre-treatment). However, the values decreased significantly (p<0.05) in the all treatment groups, T_1-T_4, on the day 3 (post-treatment) and remained within the normal range on day 5 (post-treatment) indicating sustained positive therapeutic response (Table 5).

Table 5. Respiration rate (breaths/ minute) in the buffalo calves of different treatment groups at varying intervals

Groups	Treatment intervals (day)			Overall
	0	3	5	
T_c	17.16^{bA}±0.47	18.00^{abA}±0.36	17.50^{aA}±0.42	17.55^{b}±0.24
T_1	21.33^{aA}±0.33	17.50^{bB}±0.42	16.66^{aB}±0.33	18.5^{a}±0.53
T_2	21.50^{aA}±0.42	17.50^{bB}±0.42	17.00^{aB}±0.25	18.66^{a}±0.53
T_3	20.83^{aA}±0.30	17.83^{abB}±0.30	16.83^{aB}±0.30	18.50^{a}±0.44
T_4	21.16^{aA}±0.30	19.16^{aB}±0.30	17.16^{aC}±0.30	19.16^{a}±0.42

Mean values between treatments (lower case) and between intervals (upper case) with different superscripts varied significantly (p<0.05)

The faecal consistency score is a highly reliable on-field test for rapid evaluation of the severity of calf diarrhoea and response to different therapeutic regimens. The validated faecal consistency scores ranging from 2.50±0.2 to 2.66±0.22 in the pre-treated diarrhoeic calves were significantly (p<0.05) higher than the basal value of zero in the healthy control group (Table 6). In all treatment groups T_1-T_4, the score dropped significantly (p<0.05) on day 3 (post-treatment). Whereas total normalcy was restored in T_1 and T_3 on day 3 (post-treatment), the efficacy was partial in T_2 and T_4. The positive therapeutic response continued unabated in T_1 and T_3 on day

Table 6. Faecal consistency score (0 to 3) in the buffalo calves of different treatment groups at varying intervals

Groups	Treatment intervals (day)		
	0	3	5
T_c	0.00	0.00	0.00
T_1	2.5aA±0.22	0.00	0.00
T_2	2.66aA±0.21	1.33aB±0.21	0.00
T_3	2.66aA±0.21	0.00	0.00
T_4	2.66aA±0.21	1.33aB±0.21	0.00

Mean values between treatments (lower case) and between intervals (upper case) with different superscripts varied significantly (p<0.05)

5 (post-treatment). At this point of time, total normalcy was restored also in T_2 and T_4.

The on-field parameter of tissue dehydration in calf diarrhoea, dehydration score revealed significant ($p<0.05$) increases in all the four treatment groups, T_1-T_4 in the pre-treated diarrhoeic calves vs. the normal value of zero in the control group of healthy calves, T_c (Table 7). Total normalcy in terms of this clinical parameter was restored in treatments T_1 and T_3 on day 3 (post-treatment). However, the efficacy was partial in the other two treatments, namely

T_2 and T_4. The positive therapeutic response continued unabated in treatments T_1 and T_3 on day 5 (post-treatments). At this interval, total normalcy was restored also in the other two treatment groups, namely T_2 and T_4. Significant ($p<0.05$) decline towards partial restoration of normalcy was observed in all four treatment groups; the recovery trend persisted and the normal score of zero was restored.

Table 7. Dehydration score (range, 0 to 3) in the buffalo calves of different treatment groups at varying intervals

Groups	Treatment intervals (day)		
	0	3	5
T_c	0.00	0.00	0.00
T_1	2.16aA±0.16	1.16aB±0.16	0.00
T_2	2.50aA±0.22	1.16aB±0.16	0.00
T_3	2.33aA±0.21	0.00	0.00
T_4	2.50aA±0.22	1.16aB±0.16	0.00

Mean values between treatments (lower case) and between intervals (upper case) with different superscripts varied significantly ($p<0.05$)

Conclusions:

On evidence-based restoration of the normal clinical profile post-treatment, the best bio-response was elicited by treatment T_1 (antibiotic combination, Ofloxacin + Ornidazole: Oflokind-OZ_R, Mankind) @ 20 mg bid, PO for 5 days, closely followed by treatment T_3 (dried ethanol extract of Punica granatum, common name pomegranate fruit peel) @ 10g OD, PO for 7 consecutive days.

References:

Godhami, M., Sarkar, B.L. and Ayyasami, P.M. (2014). Screening of phyto-chemicals and anti-bacterial activity of *Annonia squamosa* extracts. *International Journal of Pharmaceutical Science Invention,* **3**: 30-39.

Jasim, A.S., Wahid, A.T.A., Gabar, L.A.A. and Yussif, B.K. (2014). Evaluation of antimicrobial activity of phenolic extract from Punica granatum, Linn. peel. *Basrah Journal of Veterinary Research,* **1**: 26-32.

Radostits, O.M., Gay, C.C., Blood, D.C. and Hinchcliff, K.W. (2010). Disease of the alimentary canal. In: A Textbook of Diseases of Cattle, Sheep, Pigs, Goats and Horses, 10th edn., Saunders Publishing Company, Oxford and London, pp. 92-93.

Snedecor, G.W. and Cochran, W.G. (1994). Statistical Methods, 8th edn., Iowa State University Press, Ames, Iowa, USA.

The Blue Cross Book, July-Dec 2017, Vol. 36 : 49-55

Evaluation of Protective Action of *Boerhaavia Diffusa Linn* and *Butea Frondosa Koen* in Experimental Ochratoxicosis in Broilers in Relation with Haematological and Immunological Parameter

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Abstract:

In the present investigation attempt has been made to study the effect of ochratoxin A at 1 ppm dietary level on the haematological and immunological parameters in broilers. Nephroprotective and hepatoprotective activity of known Ayurvedic herbs *B. diffusa* (@2 kg/ton of feed and *B. frondosa* (@1 kg/ton of feed was also evaluated during the experiment. It was observed that 1 ppm ochratoxin A in feed of broiler birds, total leucocytic count and circulating lymphocytes was reduced in toxin control. Additionally it also causes destruction of lymphoid organs like bursa, thymus and spleen. The *B. diffusa* and *B. frondosa* could not protect the lymphoid tissue in toxicated groups. Immunological study in the experiment revealed reduction in HI titer against NDV in plain toxin group, however herb treated groups could not overcome the immunosuppressive effect of ochratoxin A.

Key words: *Boerhaavia Diffusa* Linn, *Butea Frondosa* Koen, Ochratoxicosis, Hematology, Immunology.

Introduction:

Indian poultry industry has recorded extraordinary growth during the last two decades and marching forward to meet out the challenges of global markets. Poultry production mainly depends on the types, source and quality of feed, which accounts for the major share of the production cost. Therefore feed efficiency is one of the key factors, which modulates the profit in poultry industry. Mycotoxicosis is one of the problems arising due to improper food storage and management, which curbs the profit by reducing the feed intake and feed conversion ratio.

Amongst the mycotoxins, ochratoxin A (OA) poses a critical hazard not only to poultry but it has also extended its tentacles to human and animal health due to its nephrotoxic, teratogenic, carcinogenic and immuno suppressive effects of OA (Pitt, 2000) In Ayurveda many plants have been identified for hepatoprotective and nephroprotective action. Hence it was thought necessary to judge the effect of traditional Ayurvedic herbal plant which is hepatoprotective and nephroprotective and which could counteract the target effect of ochratoxin A.

Boerhaavia diffusa linn (*B. diffusa*) is the plant available in India with its local name, Punarnava. Pharmocological studies have demonstrated its adaptogenic, antifibrinolytic, diuretic, anti-inflammatory and antiviral activities (Srivastava *et al*., 1998). Similarly Butea frondosa koen

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(*B. frondosa*) is another plant whose flowers are reported to possess astringent, diuretic, aphrodiasic and tonic properties. (Guhabakshi *et al*., 1987).

The present experimental work was carried out to evaluate haematological and immunological parameters for protective action of *boerhaavia diffusa* linn and *butea frondosa* koen in experimentally induced ochratoxicosis in broiler birds.

Materials and Method:

A total of 180 day-old broiler chicks were procured and maintained under Standard managemental practices. The chicks were randomly divided in 6 equal treatment groups without any significant difference in initial body weight. On 7th day, all chicks were vaccinated intraoccularly against New Castle disease virus (NDV) with Lasota strain. Booster dose was administered on 28th day with lasota strain. On 14th day, all chicks were vaccinated intraoccularly against Infectious Bursal disease (IBD) with intermediate strains.

Dietary Schedule:

The total no. of birds was divided into 6 equal groups. Group A was kept as control. Group B was fed with OA at 1 ppm. Group C was fed with herb 1 at the rate of 2kg/ton feed along with OA at 1 ppm level. Group D was fed with Butea frondosa Koen @ 1kg/ton of feed along with OA at 1 ppm level. Group E was herb 1 control and group F was herb 2 controls.

Production of crude ochratoxin A:

A known toxigenic fungal strain Aspergillus ochraceous (NRRL-3174) maintained on Sabourad's dextrose agar was used for present experiment. Ochratoxin A was produced by growing Aspergillus ochraceous on crushed maize according to Marquardt and Frohlich (1992). The estimation of ochratoxin (OA) was done according to Kurkure (2002).

Preparation of Powdered Herbs:

B. diffusa whole plants and B. frondosa flowers were obtained from Botanical garden, Nagpur, dried at room temperature and mixed with the feed in a powdered form.

Haematological Parameters:

Haematological investigations were carried out at 21st and 42nd day of age. Blood smears were prepared at the same time to study differential leucocytic count (DLC). Total leucocyte count (TLC) was estimated as per the method of Nambiar (1960) using the Natt and Herrick (1954) solution as a diluting fluid. TLC values were expressed in 103/cum. Wright's stain was used to stain the blood smears for counting DLC.

Immunological parameters:

The blood samples were collected in sterile glass test tubes at 21st and 42nd day from 10 birds of each treatment group. Serum was separated after 8 to 10 hrs and analyzed for haemagglutination inhibition (HI) titer (log2) against NewCastle disease virus (NDV) of the experimental birds.

Statistical analysis: The data generated was analysed using 'F' test using completely randomized design as per Snedecor and Cochran (1967).

Results and Discussion:

Haematological studies

Total leucocyte count (TLC):

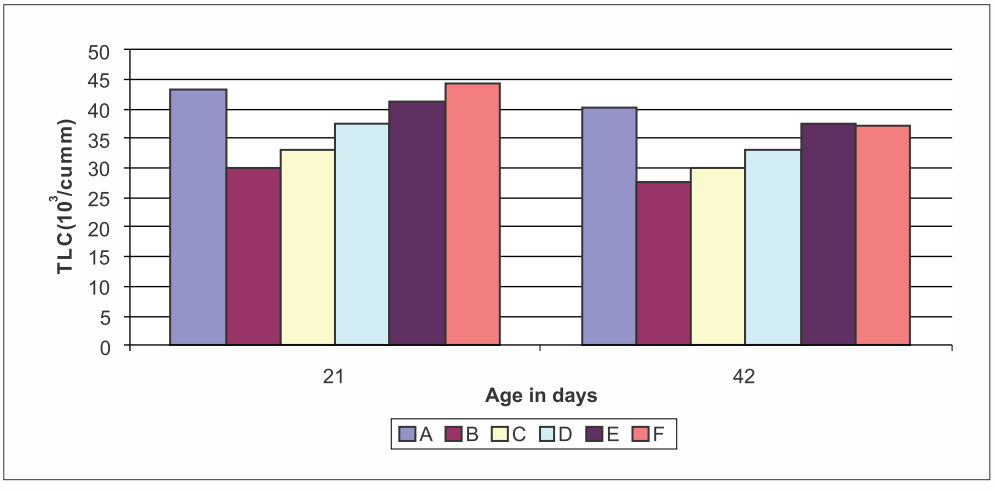
Mean TLC (103/ cumm) values of the experimental birds are presented in Table-1 and Fig.-1. During the course of experiment, TLC values were significantly lower in OA fed chicks belonging to group B in comparison to control group A. The values in control and herb treated groups E and F were statistically at par. Among

ochratoxicated group on 21st day of age in contrast to group B (30.00 ± 16.78) TLC values were higher in group D (37.66 ± 25.14). Analysis of the data indicates significant (P< 0.05) effect of treatments on TLC of experimental chicks. Reduction in TLC due to OA indicated depressed haemopoiesis and lympholytic activity of OA (Sharma, 1993). The significant reduction in TLC values due to dietary OA in present investigation are in accordance with the earlier findings of Mohiuddin *et al*. (1992) and Kurkure (2002).

Table -1: Mean total leucocyte count (10^3 /cumm) of chicks from various treatment groups

Age in Days	Treatment group						CD
	A	B	C	D	E	F	
21	43.33 ^{ab}	30.0 ^{d}	33.0 ^{cd}	37.66 ^{bc}	41.33 ^{ab}	44.33 ^{a}	7.53
	±2.05	±1.67	±2.04	±2.51	±1.58	±3.30	
42	40.16 ^{a}	27.50 ^{c}	30.16 ^{c}	33.0 ^{bc}	37.66 ^{ab}	37.16 ^{ab}	6.26
	±0.85	±1.34	±1.63	±3.09	±1.43	±2.10	
Figures with common superscript do not differ significantly from each other within row							

Fig. -1: Mean total leucocyte103/cumm of chicks from various treatment groups



Differential leucocyte count (DLC):

Results obtained for various leucocytic cells are detailed below-

Heterophils:

The mean values of heterophils (%) of the experimental birds are presented in Table-2 and Fig. - 2. Heterophils (%) in OA fed chicks and main control group A were at par at 21st and 42nd day of age in birds. In herbs treated groups E and F in comparison to group A values were significantly higher at 42nd day of age. Similarly, among toxin fed groups, values were significantly higher in group C and D in contrast to OA control group B. On comparison with group A the values of group C was significantly higher at both the period of observations.

Analysis of the data indicated significant (P< 0.05) effect of treatments on heterophils of experimental chicks. High heterophil count is suggestive of acute inflammatory activity in response to OA in experimental birds. As observed in the present study, Mohiuddin *et al.* (1992) also reported high heterophil count due to dietary OA in their study.

Table-2: Mean heterophils count (%) of chicks from various treatment groups

Age in Days	Treatment group						CD
	A	B	C	D	E	F	
21	18.16 ^{cd}	21.33 ^{bc}	23.66 ^{ab}	24.33 ^{ab}	16.00 ^{d}	25.66 ^{a}	3.95
	±0.61	±1.84	±1.01	±1.35	±1.26	±0.48	
42	20.5 ^{bc}	18.66 ^{c}	25.66 ^{a}	23.16 ^{ab}	26.5 ^{a}	27.33 ^{a}	4.45
	±1.43	±1.76	±0.57	±1.08	±1.73	±1.04	
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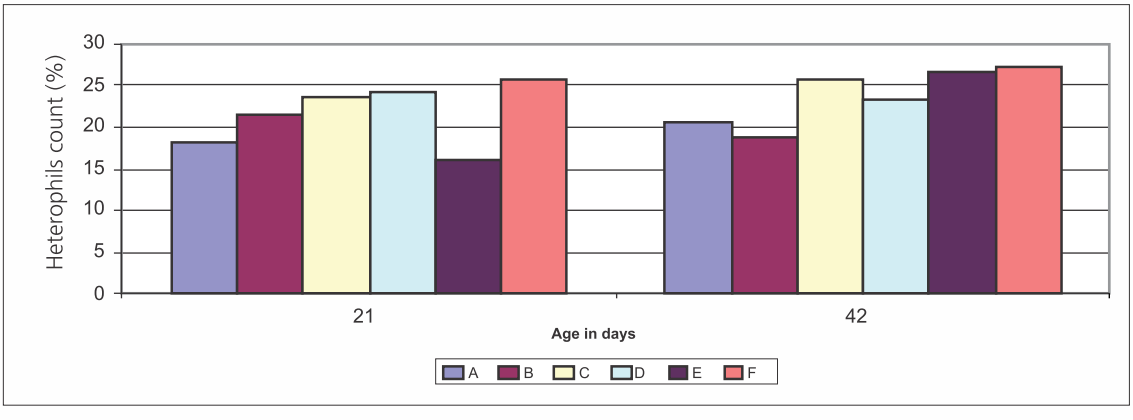
Fig. - 2: Mean Heterophils Count (%) Of Chicks from Various Treatment Groups



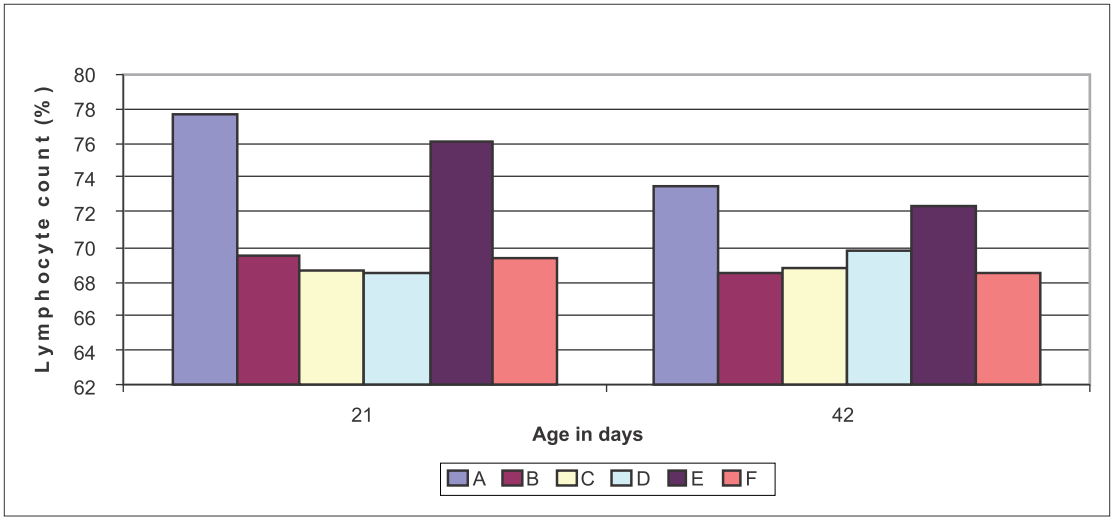
Lymphocyte:

Mean values of lymphocyte (%) of the experimental birds are presented in Table 3 and Fig. 3. Analysis of the data indicates significant (P< 0.05) effect of treatments on lymphocyte count of experimental chicks. The significant reduction in lymphocyte (%) count was recorded in group B in contrast to control group A at both the period of observations. At both periods of observations, significant lower count was observed in herbal control group F as against control group A. Amongst the groups B, C and D the lymphocytic count were differing non significantly. The observation of reduced circulating lymphocytic count in ochratoxicated chicks is due to depletion of lymphocytic population of bursal follicle and thymus. The similar findings were also reported by Mohiuddin *et al.* (1992) support the observations made in present study.

Table-3: Mean lymphocyte count (%) of chicks from various treatment groups

Age in Days	Treatment group						CD
	A	B	C	D	E	F	
21	75.66 [a]	69.5 [b]	68.6 [b]	68.5 [b]	76.1 [a]	69.3[b]	3.88
	±1.04	±1.24	±1.43	±1.13	±1.42	±0.42	
42	73.5 [a]	68.5 [b]	68.8 [b]	69.8 [b]	72.3 [ab]	68.5[b]	3.64
	±1.04	±1.20	±0.65	±1.37	±0.57	±1.43	
Figures with common superscript do not differ significantly from each other within row							

Fig.-3: Mean lymphocyte count (%) chicks from various treatment groups



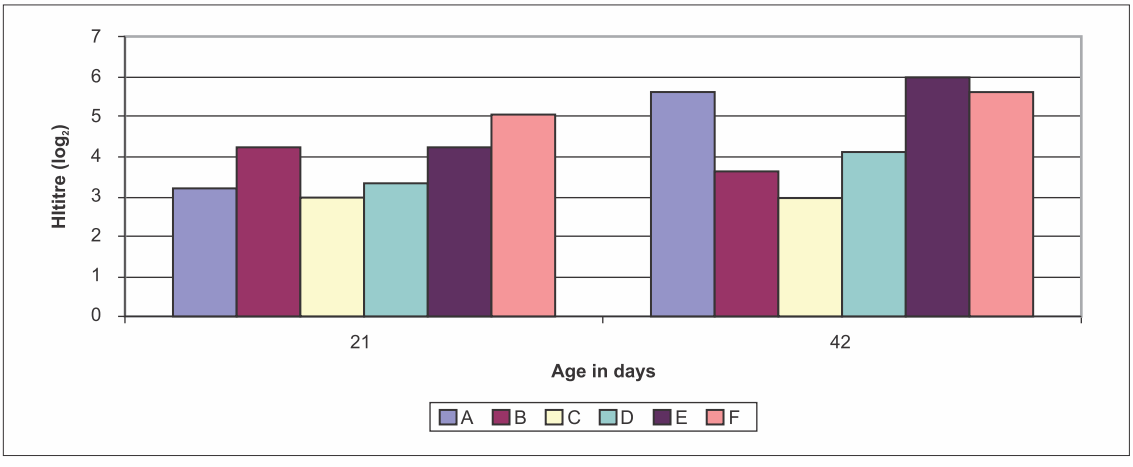
Humoral immune response

The mean Haemagglutination inhibition (HI) titres (log_2) against NewCastle disease virus (NDV) of the experimental birds on 21st and 42nd days are presented in the Table 4 and Fig. 4. It was observed that the control group A and E had significantly higher HI titres against NDV in comparison to toxin group B, C and D. The toxin group B, C and D did not differ significantly from each other indicating suppression of humoral immune response in these groups. There was significant ($P< 0.05$) effect of treatments on HI titre against NDV. The supplementation of B. diffusa in group C and B. frondosa in Group D could not restore the humoral immune response against NDV. The present findings of humoral immunosuppression due to ochratoxicosis confirm the findings of Santin *et al.*, (2001) and Sakthivelan and George (2002).

Table-4: Mean haemagglutination titre (log_2) of chicks from various treatment groups

Age in Days	Treatment group						CD
	A	B	C	D	E	F	
21	3.25	4.25	3.00	3.37	4.25	5.12	NS
	±0.36	±0.36	±0.62	±0.82	±0.77	±0.39	
42	5.62 [a]	3.62 [b]	3.0 [b]	4.12 [b]	6.0 [a]	5.62 a	1.44
	±0.37	±0.37	±0.71	±0.44	±0.32	±0.65	
Figures with common superscript do not differ significantly from each other within row							

Fig.-4: Mean haemagglutination titre (log_2) of chicks from various treatment groups



Conclusions:

From the haematological and immunological findings of the present experimental investigation it is concluded that,

- Ochratoxin A at 1 ppm dietary level reduces total leucocytic count and percent lymphocytic count in broiler birds.
- Reduction in TLC during OA indicated depressed haemopoiesis and lymphocytic activity of OA.
- The humoral immune response against NewCastle Disease virus is also depressed by the 42nd day of experiment.
- The B. diffusa and B. frondosa, both could partially protect the nephrotoxic, hepatotoxic action of OA, however the herb could not protect the immunosuppressive effect of OA in the present experimental work.
- Further investigation needs to be undertaken to elucidate the complete protective role of B. diffusa and B. frondosa.

References:

Guhabakshi, D.N.; P. Sensharm and D.C. Pal. (1987). Medicinal plants in India, Indian Council of Medical Research, New Delhi.

Kurkure, N.V. (2002) A study on pathology of ochratoxicosis in broilers. Ph. D thesis approved by Maharashtra Animal and Fisheries Sciences University.

Marquardt, R.R. and A.A. Frohlich (1992). A review of recent advances in understanding ochratoxicosis. J. Anim. Sci.,**70** : 3968-3988.

Mohiuddin, S.M.; M.R. Vikram and S.R. Ahmed (1992). Studies on ochratoxicosis in broiler chicks. Indian Vet. J., **69** : 1011-1014.

Nambiar, K.T.K. (1960). Studies on haematology of domestic fowl. M.V.Sc. thesis approved by the university of Madras.

Pitt, J.I.; J.C. Basilico; M.L. Abarca and C. Lopez .(2000) Mycotoxins and toxigenic fungi. Med. Mycol., **38** : 41-46.

Sakthivelan, S.M and V.T. George (2002). Progreesive pathological changes in ochratoxicosis in broiler chicken. Indian Vet. J., **79 (1)** : 23-26.

Santin, E.; A. Maiorka; N.M.S.Q. Gama; F. Dahlke; E.L. Krabbe; A.C. Paulillo (2001) The effect of competitive exclusion product on the prevention of the toxic effects of ochratoxin in broilers. Revista Brasileria de Ciencia Avicola, **3 (2)**: 185-191.

Sharma, R.P. (1993) Immunotoxicity of Mycotoxins. J. Dairy Sci., **76** : 892-897.

Snedecor, G.W. and W.E. Cochran (1967). Statistical Methods, 6th Ed., Oxford and IBH Publishing Co., New Delhi.

Srivastava, R.; Y.N. Shukla; K. Sushil; R. Srivastava and S.Kumar (1998). Chemistry pharmacology and botany of Boerhaavia diffusa- a review. J. Medicinal and Aromat. Plant Sci., **20 (3)** : 762-767.

Boerhaavia Diffusa Linn Plant

Butea Frondosa Koen Plant

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Fertility response in Indian Zebu cattle (Bos indicus) at synchronized ovulation by Ovsynch protocol and timed AI

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Abstract :

The present investigation was intended to study the fertility response of Indian cows (Bos indicus) to the hormonal stimulus using ovsynch protocol. A total of 90 cyclic native cows were selected and categorized in two equal groups. One group (n=45) was assigned with standard ovsynch protocol whereas another group was kept untreated as control. Timed artificial insemination was done 16-20 hours after second Gynarich injection (Day 10). All cows in both the groups were monitored to detect estrus and cows detected in estrus were inseminated artificially. Upon pregnancy diagnosis by transrectal palpation in synchronized cows after 60 days of insemination, 73.33% (33/45) and 15.55 % (07/45) conceptions were recorded on first and second service, respectively with 88.89 % (40/45) cumulative pregnancies. On the other hand in control group, 58.62% (17/29) and 13.79% (04/29) conceptions were recorded on first and second service, respectively with an overall 46.67% (21/45) pregnancy rate. A significant difference is appreciable upon comparison of reproductive performance of synchronized (88.89 %) vs. non-synchronized (46.67 %) cows in terms of overall pregnancies. These outcome of trial yielded promising results in terms of pregnancy rate in deshi cows treated with ovsynch protocol.

Key words: Bos indicus, Ovsynch protocol and pregnancy

Introduction :

An obvious disparity in productive and reproductive performance is evident among the different breeds of cattle across the world. After genetics, the environmental and management factors especially nutrition have a direct influence on these traits. A negative effect of high lactation on fertility is well established nowadays and is attributed to heavy drain of energy and body ingredients needed for milk synthesis and secretion. In this perspective indigenous cattle are more fertile than exotic or crossbred cattle (De Vaccaro *et al.*, 1977; Mukasa-Mugerwa, 1989) and hence a prompt response to exogenous hormonal stimulus is expected in Desi cows provided with optimum management. In this study, the fertility response in terms of estrus induction, cyclicity, pregnancy and calving rate was studied in 90 indigenous cows of different breeds following hormonal stimulus.

Material and methods :

A total of 90 pluriparous indigenous cyclic cows having optimum body condition score and maintained in iso-managerial condition at farm were selected for the study. The ovarian cyclicity was confirmed by trans-rectal palpation of either CL or follicle on ovaries after 60 or above 60 days postpartum. Breed equality was strictly considered while categorizing the animals in two

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groups as treatment versus control. Standard Ovsynch protocol using injection Gynarich (Intas Pharmaceuticals, @ 10 µg/ cow on Day 0 and 9) and injection Pragma (Intas Pharmaceuticals, @ 500 µg/ cow on Day 7) was assigned to 45 cyclic cows. Timed artificial insemination (AI) was done 16-20 hours after second Gynarich injection (Day 10). Conception was confirmed in treatment group cows by trans-rectal palpation 70 days after first Gynarich injection (Day 0). Remaining 45 cyclic cows were kept as untreated control and monitored to record estrus for two cycle length and detected cows were inseminated artificially. Pregnancy diagnosis in control animals was made by trans-rectal palpation. Results were compared in treatment versus control group based on conception rate.

Result and Discussion :

The objective of this study was to evaluate fertility response of Indian Desi cows (Bos indicus) to Ovsynch protocol, since ample reports are available citing the outcomes of different hormonal protocols in exotic and cross bred cows. The Ovsynch protocol was developed to synchronize emergence of a follicle wave, regression of corpus luteum (CL) and ovulation, thereby allowing for AI at a fixed time (Pursley *et al.*, 1995; Diskin *et al.*, 2002), and it has become widely used for synchronization of ovulation and AI in dairy herds (Caraviello *et al.*, 2006). Several attempts to improve ovulatory response and conception rate to the Ovsynch protocol have been evaluated with different modifications.

All 45 synchronized and inseminated cows were followed up for repeat estrus and 10 cows were found in estrus in their subsequent cycle. Similarly, untreated animals were also monitored for estrus detection for first 24 days where 64.44% (29/45) cows exhibited overt estrus and inseminated artificially and further 08 cows repeated estrus in their subsequent cycle and were again inseminated artificially.

Upon pregnancy diagnosis by transrectal palpation in synchronized cows after 60 days of insemination, 73.33% (33/45) and 15.55 % (07/45) conceptions were recorded on first and second service, respectively with 88.89 % (40/45) cumulative pregnancies. On the other hand in control group, 58.62% (17/29) and 13.79% (04/29) conceptions were recorded on first and second service, respectively with an overall 46.67% (21/45) pregnancy rate. A significant difference is appreciable upon comparison of reproductive performance of synchronized (88.89 %) vs. non-synchronized (46.67 %) cows in terms of overall pregnancies.

This effect of treatment can be attributed to hormonal control on ovarian dynamics ensuring timed ovulation and thereby synchronizing the union of male and female gametes. The emergence of each new wave is stimulated by a transient increase in FSH. Each follicle wave has an inherent life span of 7–10 days as it progresses through the different stages of development, viz., emergence, selection, dominance and atresia or ovulation. GnRH-prostaglandin-GnRH regimens have been widely used in exotic and cross-bred dairy as well as beef cows with variable success rate. However, there is paucity of information on fertility response of Indian Zebu cows to the Ovsynch protocol. A better understanding of the hormonal control of follicle growth is a prerequisite in order to obtain more precise control on estrous cycle allowing one for AI at a predetermined time giving high pregnancy rates without recourse to detection of estrus.

Galvao and Santos (2010) reported 36.9% conception rate to the Ovsynch protocol in lactating Holstein cows. On the other hand an overall 43.7% conception rate was stated in cyclic buffaloes after fixed time insemination following Ovsynch protocol with and without progesterone supplementation (De Rensis *et al.*,

2005). In this study, the conception rate to Ovsynch protocol in Bos indicus was found better than earlier reports in exotic and crossbred cows.

Conclusion :

The study was carried out to evaluate the fertility response to Ovsynch protocol in 90 indigenous cyclic cows of different breeds of India. The outcome of trial yielded very promising results in terms of pregnancy rate. Upon comparison of pregnancy percentage in treatment (88.89 %) vs. control (37.78 %) group, showed a significant difference. Further, this study also revealed the prompt and superior response of hormonal control of breeding in deshi cows.

References :

Caraviello, D.Z., Weigel, K.A., Fricke, P.M., Wiltbank, M.C. and Florent, M.J., (2006), Survey of management practices on reproductive performance of dairy cattle on large US commercial farms. J Dairy Sci, **89**: 4723–4735.

De Rensis, F., Ronci, G., Guarneri, P., Nguyen, Bui Xuan, Presicce, G.A., Huszenicza, G. and Scaramuzzi, R.J., (2005), Conception rate after fixed time insemination following ovsynch protocol with and without progesterone supplementation in cyclic and non-cyclic Mediterranean Italian buffaloes (Bubalus bubalis). Theriogenology, **63** (7): 1824-1831.

de Vaccaro, L., Garcia, M., Bazan, O. and Bardales, E., (1977), Fertility and body weight at first mating of zebu cattle grazing cleared jungle land in the Amazon. Tropical Agriculture (Trinidad), **54**: 223-227.

Diskin, M.G., Austin, E.J. and Roche, J.F., (2002), Exogenous hormonal manipulation of ovarian activity in cattle. Dom Anim Endocrinol, **23** (1-2): 211-228.

Galvão, K.N. and Santos, J.E., (2010), Factors affecting synchronization and conception rate after the Ovsynch protocol in lactating Holstein cows. Reprod Domest Anim, **45** (3): 439-46.

Mukasa-Mugerwa, E., (1989), A Review of a Reproductive Performance of Female Bos indicus (zebu) Cattle. ILCA monograph (6) published by International Livestock Centre for Africa

Pursley, J.R., Mee, M.O. and Wiltbank, M.C., (1995), Synchronization of ovulation in dairy cows using PGF2alpha and GnRH. Theriogenology, **44**: 915–923.

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Chronic Respiratory Disease (CRD) In Desi Birds Complicated by E. Coli Infection

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Abstract :

Therapeutic management of *Mycoplasma gallisepticum* in desi birds complicated by *E. Coli* infection treated with anti infectives and immunity boosters is reported.

Key words: *Mycoplasma gallisepticum,* Chronic Respiratory Disease (CRD), *E. Coli,* Immutas PLUS.

Introduction :

Mycoplasma gallisepticum (MG) belongs to the class Mollicutes and the family Mycoplasmataceae. *Mycoplasma gallisepticum* is considered the primary cause of Chronic Respiratory Disease (CRD) in chickens and infectious sinusitis in turkeys, chickens, game birds, pigeons and passerine birds of all ages (Quinn *et al*., 2012). *M. gallisepticum* infections can cause significant economic losses in poultry farms from chronic respiratory disease, reduced feed efficiency, decreased growth and egg production. *M. gallisepticum* infections are notifiable according to the World Organization for Animal Health (Pattinson *et al.,* 2008, OIE) and believed to cost the worldwide poultry industry over $780 million every year (Friend and Franson, 1999).

The most common symptoms of *Mycoplasma gallisepticum* infections in poultry are eye problems and inflammation around the face. Other symptoms include open mouth breathing and gurgling throat sounds (Pattinson *et al.,* 2008). The mortality entirely by CRD is negligible, but it is important because it predisposes the birds to infection for other disease producing organisms like *E.coli* (Bradbury, 2001).

M. gallisepticum can be transmitted within some poultry eggs, which can come from infected breeders to progeny. Also, *M. gallisepticum* can be infected via infectious aerosols and through contamination of feed, water and environment as well as human activity on fomites, which can come from equipment and shoes. Some sources that could possibly cause infection and transmission are cold weather, poor air quality, concurrent infections and some live virus vaccinations. The organism has long incubation period of 10 to 30 days. Therefore, only few outbreaks are seen in birds under 4 weeks old (Bradbury, 2001).

History, Postmortem Examination and Laboratory Diagnosis :

A poultry farm consisting of 250 native poultry birds (both Aseel and Kadaknath breeds) were reported to be having mortality of 3-4 birds per day with signs of coughing, nasal and ocular discharge, poor productivity, slow growth, leg problems, stunting and inappetance. Symptoms were more pronounced in 5 month old birds.

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Post-mortem examination of fresh dead birds was conducted at the farm site, which revealed catarrhal inflammation of nasal passages, sinuses, trachea and bronchi and the air sacs were thickened with pus (Fig 1 and 2). Other lesions included airsacculitis, pericarditis and perihepatitis (Fig 4). In the severely affected live birds, further symptoms included swelling of the orbital sinus ("donut" shaped swelling around the eye), pussy eye discharge, sticky eyelids and open mouth breathing were noticed (Fig 3). Liver samples and airsac swabs were subjected to culturing and *E. Coli* was isolated on EMB agar. Based on the clinical signs, postmortem lesions and cultural tests, the farm was found to be affected with Chronic Respiratory disease by *Mycoplasma gallisepticum* complicated by *E. Coli* infection. *E. coli* isolates were subjected to Antibiotic sensitivity (Fig 5).

Treatment and results :

Treatment regimen for the affected flock started with administration of combination of doxycycline hydrochloride based on sensitivity

Fig 1: Inflammed trachea with cheesy material and pus

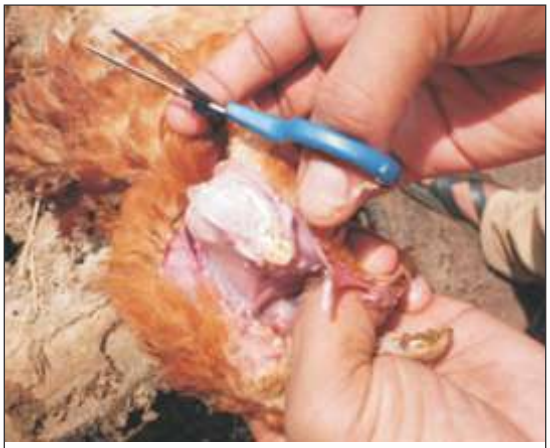

Fig 2: Catarrhal inflammation of nasal passages

Fig 3: Swelling of the orbital sinus ("donut" shaped swelling around the eye), pussy eye discharge

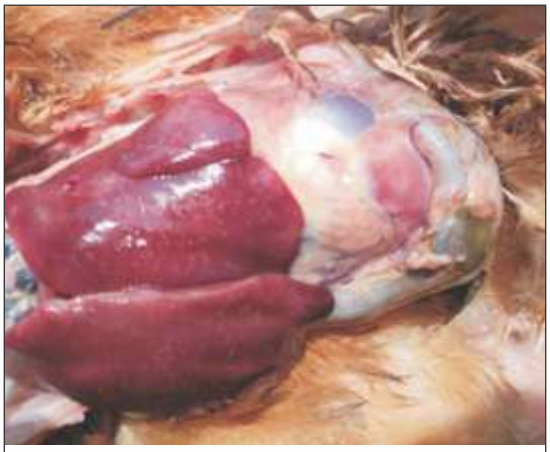

Fig 4: Perihepatitis lesions

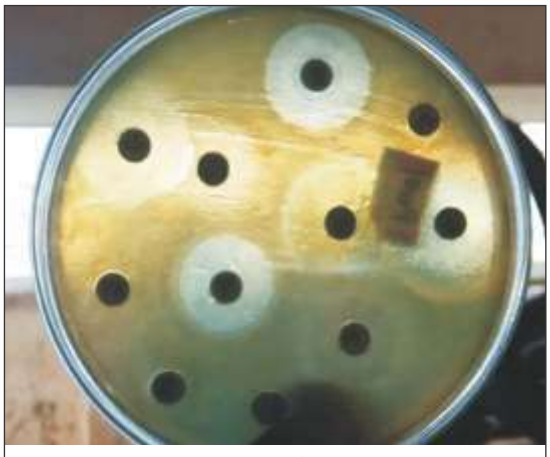

Fig 5: Cultural sensitivity of E.coli isolates (ABST)

results for *E. coli* infection and tylosine tartrate for *Mycoplasma* into the drinking water for 5 days. Simultaneously effected oral administration of Immutas PLUSa @ 10 gm per 100 kg of feed as an immunity booster. Gentamicin eye cream was applied to those birds with eye symptoms for 3 days. Birds were shifted to more ventilated area. The birds showing critical respiratory and ocular lesions were culled. The affected birds had shown improvement in clinical signs 4 days after initiation of treatment.

Discussion :

Since CRD causes reduced feed and growth production, carcass condemnations and retarded growth in juveniles lead to serious economic losses. Also, chickens loose about 16 eggs over their laying cycle of 45 weeks. Those birds with longstanding and complicated Chronic Respiratory Disease should be culled as it is too late for a full recovery and they will spread the disease to other birds in the flock (Kleven, 2003).The remainder of the flock should receive a 5 day treatment course as described for stage two of this disease (Kleven, 2003). *E. coli* infections have also been found to be a frequently complicating organism while other diseases which may complicate CRD include Mareks disease (Herpes), ILT (infectious laryngo-tracheitis) and Pox virus.

Many serology tests can be performed to diagnose *M. gallisepticum*: like serum plate agglutination (SPA) test, hemagglutination inhibition test (HI), or enzyme-linked immunosorbent assay (ELISA). The SPA test is more commonly used because it is the simplest and least expensive. CRD infections are to be differentiated from Infectious Coryza, Aspergillosis, viral respiratory diseases, vitamin A deficiency (Hennigan *et al.,* 2012).

The tetracycline group of drugs and tilmicosin, tylosin, spiramycin, tetracyclines, fluoroquino-lones are useful in treatment of Mycoplasmal infections complicated by *E. coli* infections (Wang *et al.,* 2001). Nitrofurans especially furazalidone is very effective. Aminoglycosides may be applied in sinuses after removal of mucous by spraying in birds (Abrams, 2002). Immutas PLUSa contains purified β-glucans, Vitamin E, Selenium & nucleotides and β-glucans are known to improve innate immunity in chickens (Lowry *et al.,* 2005).

Increased ventilation without drafts reduces the spread and severity of CRD (Heleili *et al.*, 2011). Eradication programmes are based on purchase of uninfected chicks, all-in/all-out production, biosecurity, and routine serological monitoring. In some circumstances, preventative medication of known infected flocks may be of benefit. Live attenuated or naturally mild strains are used in some countries and may be helpful in gradually displacing field strains on multi-age sites. Birds that have recovered from clinical signs of the disease have some degree of immunity. Such flocks, however, carry the organism and can transmit the disease to susceptible stock by direct contact or by egg transmission to their progeny (Heleili *et al.,* 2011).

Acknowledgement :

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a - Brand of Intas Animal Health, Ahmedabad

References :

Abrams, G. A., Paul-Murphy, J., & Murphy, C. J., (2002), Conjunctivitis in birds. *Veterinary Clinics of North America: Exotic Animal Practice,* **5**(2), 287-309.

Bradbury, J. M., (2001), Avian Mycoplasmosis. In: Frank Jordan et al, eds. Poultry Diseases.5th ed. W. B. Saunders, 178-193.

Friend, M. and Franson, J.C., (1999), Field Manual of Wildlife Diseases: General Field Procedures and Diseases of Birds, U.S. Geological Survey, Biological Resources Division, Information and Technology Report 1999-001. Washington, D.C.

Heleili, N., Mamache, B., & Chelihi, A., (2011), Incidence of avian mycoplasmosis in the région of Batna, Eastern Algeria. *Veterinary World,* **4**(3), 101-105.

Hennigan, S. L., Driskell, J. D., Ferguson-Noel, N., Dluhy, R. A., Zhao, Y., Tripp, R. A., & Krause, D. C., (2012), Detection and differentiation of avian mycoplasmas by surface-enhanced Raman spectroscopy based on a silver nanorod array. *Applied and environmental microbiology,* **78**(6), 1930-1935.

Kleven, S. H., (2003), Recent developments in diagnosis and control. World Poultry, *Mycoplasma* Special **19**: 8-9.

Lowry, V.K., Farnell, M.B., Ferro, P.J., Swaggerty, C.L., Bahl, A., & Kogut, M.H., (2005), Purified β-glucan as an abiotic feed additive up-regulates the innate immune response in immature chickens against *Salmonella enterica serovar Enteritidis. International journal of food microbiology,* **98**(3), 309-318.

M. Pattison, McMullin, P. F., Bradbury, J. M., Alexander, D. J., (2008), Bacterial diseases: Avian Mycoplasmas, In, Bradbury J. M. (Ed.): Diseases of poultry 6th ed. Iowa State University Press, Ames: 220-235.

Quinn, P. J., Markey, B. K., Leonard, F. C., Fitzpatrick, E. S., Fanning, S. and Hartigan, P. J., (2012), *Veterinary Microbiology and Microbial Disease,* 2nd Edition, Blackwell Science Limited, UK, p. 219-31.

Wang, C., Ewing, M., & A'arabi, S. Y., (2001), In vitro susceptibility of avian mycoplasmas to enrofloxacin, sarafloxacin, tylosin, and oxytetracycline. *Avian diseases,* 456-460.

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Microbial Assessment of Sources of Contamination in fish market of Hyderabad

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(received 20/06/2017 - accepted 30/09/2017)

Abstract :

A total of 60 swab samples were collected from fish cutting knife, platforms and hands of personnel from local fish market of Hyderabad. The TVC of platform swab sample was 6.79 ± 0.03 Log CFU/cm^2. The TVC counts of Knife, Platform and hand swab differ significantly. The *E coli* count of knife, platform and hands were 6.01 ± 0.03 Log CFU/cm^2, 6.31 ± 0.01 Log CFU/cm^2 and 5.9 ± 0.02 Log CFU/cm^2, respectively. The highest *Staphylococcus aureus* count was observed in hand swab samples.

Key words : Microbial Assessment, Fish, TVC.

Introduction :

Hazard refers to unacceptable contamination, survivable and or growth of hazardous micro-organisms. In case of fish, it should also be extended to any pathological condition. HACCP ensures food safety by exercising control to prevent, any objectionable contamination or multiplication of micro organisms in production chain (Sherikar *et al.,* 2013).

Fish is a food with high nutritional value, high water activity and it is very susceptible to spoilage. Microbiological spoilage not only from aquatic environment of fish habitat but also from inappropriate processing and storage (Ghaly *et al.,* 2010).

Unhygienic contact surfaces in production chain of fish are also a crucial factors for the quality of the final products. Micro-organsisms adhere to surface of contact portion and make a biofilm (Temeli *et al.,* 2003). Incidence of micro-organisms in equipments and utensils in food processing areas, caused due to unhygienic techniques, may result in serious public health issues.

Keeping these facts in view, present study was designed to microbiological assessment of sources of contamination in fish market in Hyderabad.

Materials and methods :

All samples were collected from local fish market of Hyderabad. Sterile cotton swabs (3 cm long and 1 cm in diameter) moistened with 1 percent peptone water was used to collect samples from knife, platform and hands of personnels by following method (Morris and Wells, 1970). Samples collected are shown in Fig-1. The swab samples were transferred on ice to laboratory. For evaluating total viable count, (TVC), *E coli* count, *Staphylococcus aureus* count standard Pour Plate Technique was followed. For TVC

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Fig-1: Showing sample collection

Collection of Swab samples from hands

Collection of swab samples from platform

Collection of swab samples from knife

plate count agar, *E coli* EMB agar and for *S. aureus* Baird parker agar was used. Dilution of inoculums was standardized for further use. A quantity of inoculums from 10^{-3} and 10^{-4} dilutions used for pour plate technique was 0.1 ml to which molten agar (Hi-media Laboratories, Mumbai) (45-50°C) was poured and mixed thoroughly by rotating plates. Incubation was done at 37°C for 24 hours. TVC were calculated by using standard formula as per method described by AOAC (1997).

The Bacterial colonies were counted with the help of the bacteriological colony counter and CFU was calculated by using the following formula

$$\log_{10} \text{CFU/gm} = \frac{\Sigma C}{[n_1 + (0.1 \times n_2)] \times d}$$

Where,

ΣC = Total number of colonies counted from all plates

n_1 = No. of plates of lower dilution

n_2 = No. of plates of higher dilution

d = Dilution factor

A total of 20 shops were evaluated and 20 samples each from knife, platform and hand swabs were collected.

Results and discussion :

Contamination is the state of impurity or unfitness for use due to introduction of undesirable elements. Possible sources of microbial contamination come from utensils, equipments, poor hygienic practices of food handlers. The TVC counts indicate microbial contamination (Lani *et al*., 2014).

The results are shown in Table-1. It is evident that the highest TVC count (6.79 ± 0.03 Log CFU/cm^2) was observed in samples of platform followed by knife (6.50 ± 0.01 Log CFU/cm^2) and hands of personnels (6.39 ± 0.03 Log CFU/cm^2). The results indicate level of hygiene maintenance in decreasing manner at platform followed by knife and hands of personnels. The mean TVC counts differ significantly ($p<0.01$). Earlier Bordoloi *et al.,* (2014) reported microbial contamination of table tops, washing water and ice samples in retail fish market at Agarttala and reported the highest TVC count in platform swab, which was 11 Log_{10} CFU. Sousa *et al.,* (2014) also reported microbial contamination from utensils, knives, tables and hands of personnels in Brazil and found the TVC count of 4.17 Log CFU in skinning machine, which is lower than the present value.

In the present study, the E coli count was found highest in platform (6.31 ± 0.01 Log CFU/cm^2) followed by knife (6.01 ± 0.03 Log CFU/cm^2) and

Table-1. Sources of contaminations and their microbial contamination counts

Sl No	Sources	No of Samples	TVC Log CFU/cm^2	*E. coli* count Log CFU/cm^2	*Staphylococcus aureus* count Log CFU/cm^2
1	Knife	20	6.50^a ± 0.01	6.01 ± 0.03	5.1 ± 0.01
2	Platform	20	6.79^b ± 0.03	6.31 ± 0.01	5.5 ± 0.02
3	Hands of personels	20	6.39^c ± 0.03	5.9 ± 0.02	5.7 ± 0.04

hands of personnel (5.9 ± 0.02 Log CFU/cm^2). *Staphylococcus aureus* count in the present study was found in hands of personnel (5.7 ± 0.04Log CFU/cm^2) followed by platform (5.5 ± 0.02Log CFU/cm^2) and knife (5.1 ± 0.01Log CFU/cm^2). It was found that there was no significant difference in count of both the organisms among three different sources. Earlier Bordoloi *et al.* (2014) reported 6 Log CFU/cm^2 of *E coli* count at table tops, which is same as the present study and *S. aureus* count 8 Log CFU/cm^2, which is higher than the present value.

Presence of *Staphylococcus aureus* in hands of personnel indicate unhygienic practices at fish slaughter house. *S. aureus* is an indicator of hygiene and sanitary conditions. The presence of this organism indicates the unhygienic condition during processing, storage etc. and the contamination of fish could be the result of combination of improper handling, improper storage and cross contamination (Simon and Sanjeev, 2007). Staphylococcal food poisoning is one of the most prevalent causes of gastroenteritis world wide, which is caused by the ingestion of food that contains preformed toxins (Jablonski and Bohach, 2001). Natural habitat of E. coli is the gastrointestinal tract of warm blooded animals and the ICMSF, (1986) recommends testing for the presence of this organism as an indicator of post harvest contamination particularly from faecal origin and its limit is recommended as less than 100 *E coli* per gram of fish. Use of same water for several lots of fish, unhygienic toilets and hand-wash facilities, accumulation of dirty wastes in the market premises helps in colonization of micro-organisms with high count of *E. coli.*

Conclusion :

Environmental sources of contamination play a major role in rendering fish and fish products unsafe for human consumption. Awareness and educating the people regarding proper maintenance, sanitation and regular monitoring is highly needed.

References :

Association of Official Analytical Chemists (1997), 16th edn. 3rd revision, Washington, U.S.A.

Bordoloi R., A. U. Muzaddadi and S. Ganguly, (2014), Sanitary condition of Battala fish market at Agartala, Tripura and its Public health significance. Int. J. Curr. Microbiol. App. Sci. **3**(3): 176-181

Ghaly A. E., D. Dave, S. Budge and M. S. Brooks, (2010), Fish spoilage mechanisms and preservation techniques: review. Am. J. Applied. Sci. **7**(7): 859-877.

International Commission on Microbiological Specification for food (ICMSF), 1986, 2nd ed. Microbiological analysis: principles and specific applications. University of Toronto press, New York, USA.

Jablonski L M. and Bohach G A., (2001), Staphylococcus aureus. In: M.P. Doyle, L. Beuchat and T. Montville, (eds), Food microbiology: fundamentals

& frontiers (2nd ed.), ASM Press, Washington DC (2001) pp 411 33.

Lani Mohd N., Mohd F.M. Azmi, R. Ibrahim, R. Alias and Z. Hassan, (2014), Microbiological quality of food contact surfaces at selected food premises of Malaysian heritage food (Satar) in Terengganu, Malaysia.The IJES. **3**(9): 66-70.

Morris, G.K. and J. B. Wells, (1970), Salmonella contamination in poultry processing plant. Appl. Microbiol. **19** (5) : 795 – 799.

Sherikar A. T., V. N. Bachil and D. C. Thaplial, (2013), Text book of Elements of Veterinary Public Health. Indian Council of Agriculture Research, New Delhi.

Simon S S. and Sanjeev S., (2007), Prevalence of enterotoxigenic Staphylococcus aureus in fishery products and fish processing factory workers. Food Control **12**:1565-8

Sousa C.L., Jose A. Freitas, Lucia F.H. Lourenco, Eder A.F. Araujo and Maria Regina S. PeixotoJoele, (2014), Microbiological contamination of surfaces in fish industry. Afr. J. Microbiol. Res. **8**(5): 425-431.

Temelli, S., Dokuzlu, C., & Sen, M. K. C., (2006), Determination of microbiological contamination sources during frozen snail meat processing stages. *Food control,* **17**(1), 22-29.

Metabolic and Mineral deficiency diseases of animals

Milk fever

- Disease of high yielding animals occurring within first 24 to 48 hours after parturition.
- Cause is decreased concentration of calcium in tissue fluids.

Clinical signs:

Initially there are signs of excitement, later on sternal recumbancy, dullness, coldness of extremities, subnormal temperature (97-100^{0}F) and later on coma.

Treatment:

100-200 grams of calcium boro-gluconate as 20 to 30% solution intravenously. Give half dose intravenously and half by subcutaneous route.

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Incidence of Sheep and goat Pox out breaks in and around Satara District

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(received 29/08/2017 - accepted 05/10/2017)

Abstract :
Incidences of sheep and goat pox is increasing day by day, routine vaccine of sheep pox found to be non protective for the goats. Clinical signs, gross lesions and histopathology of affected organs confirm the pox in caprine and ovine. Viral specificity plays important role in immunization of goats; routine sheep pox vaccine is not immunoprotective for goats.

Key words : sheep and goat pox, histopathology, immunization.

Introduction:

Migratory sheep and goat population is widely distributed in and around district Satara. Most of the shepherds are unaware of regular vaccination schedule of sheep and goats. Traditional vaccination schedules is followed by giving only one vaccine to sheep and goat i.e. enterotoxaemia single dose. Rests of the vaccines are not followed by shepherds to their sheep and goat unless there is a major problem of contagious diseases. 48 flocks from various locality of district Satara were examined and observed for clinical signs and detailed pathology. In the present study detailed investigations of such outbreak of sheep and goat pox is discussed and along with its pathology, treatment aspects and preventive measures.

Material and methods:

In the present study 48 sheep and goat flocks were observed in period of two months (10 April 2017 to 10 June 2017) in various parts of Satara district and it's around. Detailed investigations about flock size, morbidity and mortality percentages, clinical signs, post mortem lesions and histopathological investigations were carried out (Table 1). Post mortem examination and histopathology of affected organ system was carried out on two sheep/ goats from each affected flock. Microbiological investigations of secondary bacterial infection were carried out by standards isolation protocols.

Observations and results: out of 2170 animals 995 sheep and goats were affected and out of 995, 323 animals were died. Most of the affected animals were sold by shepherds for slaughter purposes at local market. Rests of the healthy animals were vaccinated by sheep pox and goat pox vaccines after deworming.

Clinical signs: sheep and goats showed similar types of clinical signs and post mortem lesions. Clinical signs includes high fever 105-106^{0}F, nasal discharge, coughing, wasting, pustules and papules at the hairless portions of body; muzzle, oral mucosa, lateral commensures, udder and abdominal skin showed pox lesions. Nasal discharges were varying from serous to muco-purulent to blood tinged. Open mouth breathing, violent coughing and anorexia evident. Some of the cases showed tympani and diarrhoea. Abortions noticed in few cases.

Out of 2170 cases of sheep goats 995 cases were affected by pox i.e. 45.85 % and out of it 323 cases were died i.e. 32.46% . (Fig. No. 1)

Detailed postmortem examination of dead animals revealed erosions in oral cavity,

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Table 1

Location	Flock size	Morbidity	Mortality
Kapadgoan Tal . Phaltan dist Satara	220	76	16
Chavanwadi Tal. Phaltan dist Satara	120	72	21
Adarki Tal. Phaltan dist Satara	250	110	32
Takewadi Tal. Baramati, Dist. Pune	160	90	20
Shedgewadi Tal. Kahandala	150	65	28
Gulunche Tal. Purandar	210	109	32
Murti Tal. Baramati, Dist Pune	80	43	31
Kesurdi Tal Khandala dist Satara	210	130	24
Padegoan Tal Khandala dist Satara	180	70	30
Dahiwadi Tal. Dahiwadi dist Satara	220	120	26
Nira tal Purandar Dist. Pune	250	60	36
Koregoan Tal Koregoan dist Satara	120	50	27

suppurrative inflammation of oral mucosa and swelling of lips. (Fig. No. 2), ulcerative tracheitis and pharyngitis (Fig. No. 3) , severe inflammation of trachea and bronchi. Lungs showed typical small sized white nodular pox lesions throughout the section of lung (Fig. No. 4). Pericardium, pleura showed similar type of nodules (Fig. No. 5). Rumen mucosa (Fig. No. 6), mesentery, serosa of intestines (Fig. No. 7) and uterus showed similar types of lesions. Kidneys (Fig. No. 8), urinary bladders showed similar type of white foci. On cut sections of lung edema, severe congestion and consolidation were evident. Nasal discharge and lungs samples were taken for microbiological investinations. Out of 323 cases 78 cases showed Pasteurella spp , 43 cases were of Pseudomonas and 2 were of Staphylococcus spp which were observed as secondary complications.

Histopathological examinations revealed intracytoplasmic inclusion bodies (Fig. No. 9) in epithelial cells of skin, oral mucosa, trachea and pharynx. Besides this acanthosis, hyperplasia of epithelial cells (Fig. No. 10), and infiltration of macrophages, neutrophils, lymphocytes around the necrosed tissues in skin. Multifocal necrosis in lung evident and similar type of infiltration was observed.

Treatment and prevention aspects: in severe cases of pox animals dose not respond to any medications. However long acting enrofloxacin & amoxicillin, ceftiofur sodium were tried. Secondary bacterial complications were checked due to antiobiotics but complete recovery did not observed due to multi organ failure, hence shepherded sold out ailing animals for slaughter. Remaining animals were vaccinated with sheep pox and goat pox vaccines @ 1 ml intramuscular for sheep and goats, respectively. Along with it liquid vit. E and selenium were given for 5 days to keep immunity stronger.

As day by day disease scenario in migratory sheep and goat is changing, no specific seasonal out breaks are observed; any disease can explore any time. It is advisable to follow the strict vaccination schedule of all the diseases including sheep and goat pox. Vaccine literacy of tribal/ migratory shepherded is the only key for the prevention of contagious viral diseases. As clinical signs of specific viral diseases observed in flock it could be difficult to treat or control it; hence prevention by vaccination will protect valuable live stocks of shepherds.

Fig. no 1: incidence of morbidity and mortality

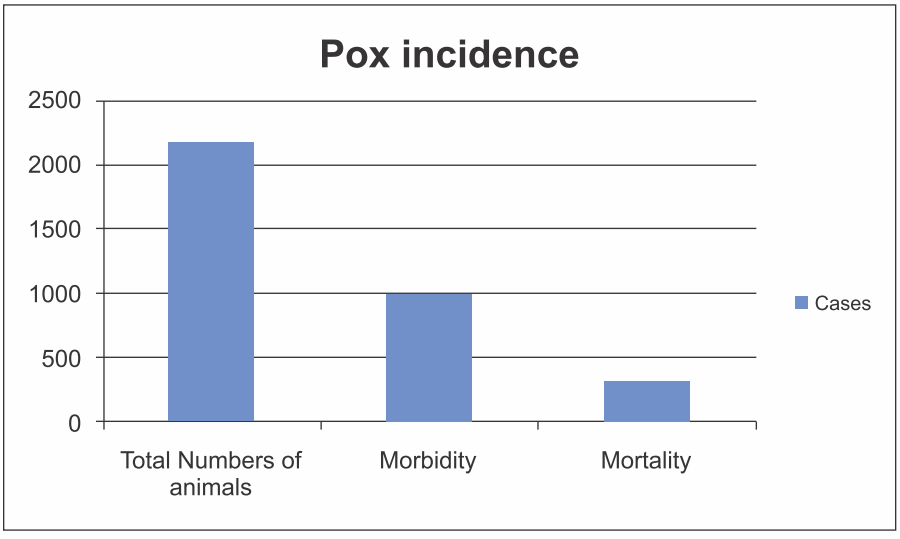

Fig. no.2. Oral lesions occurred in sheep

Fig. no. 3 . ulcerative tracheitis and pharyngitis

Fig. no. 4. Pox lesions in lung tissues.

Fig. no. 5. Pox lesions on the pericardium

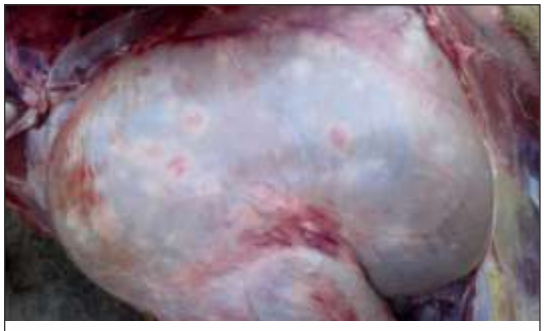

Fig. no. 6. Pox lesions on rumen mucosa

Fig. no. 7. Pox lesions on mesentery and serosa of intestine.

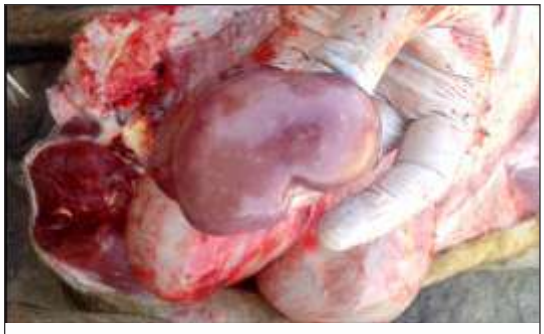

Fig. no. 8. Pox lesions on kidney

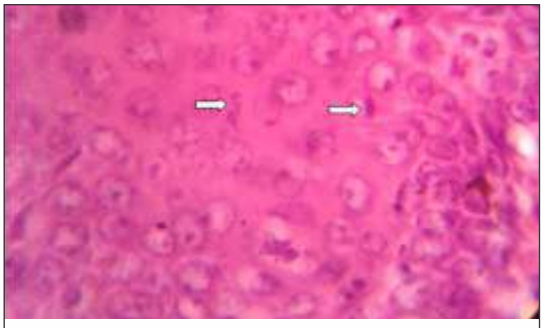

Fig. no. 9. intra cytoplasmic inclusion bodies in squamous cells (white arrow).

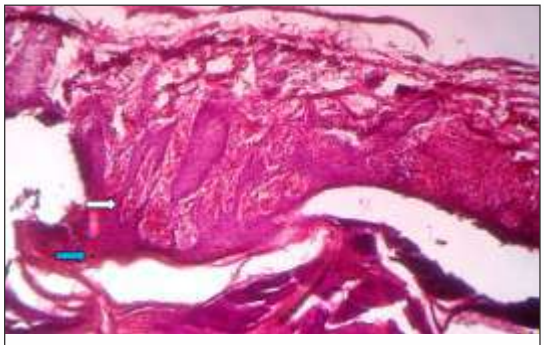

Fig. no. 10. Photograph showing acanthosis (blue arrow) and hyperplasia of skin epithelial cells (white arrow)

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Ultrasonographic and Laparoscopic Diagnosis of Bilateral Salpingitis and Hydrosalpinx in a Crossbred Cow

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Abstract:

A crossbred Holstein Friesian cow was presented with a history of infertility. The animal was subjected to per rectal palpation, ultrasonographic examination and laparoscopic visualization of the reproductive tract and the condition was diagnosed for the presence of parovarian cysts, nodular swellings and ovarobursal adhesions affecting mesosalpinx and bilateral salpingitis with the accumulation of fluid in the lumen of oviduct. The lesions were later confirmed by post-slaughter examination.

Key words: Ultrasonography, Laparoscopy, parovarian cyst, salpingitis, cow.

Introduction:

Abnormities of oviducts have been attributed as one of the reasons for infertility in cattle as it plays a vital role for the transport of gametes, fertilization and early nourishment and transportation of zygote. Salpingitis is the inflammation of the oviducts resulted from various causes including infectious and traumatic origin. Clinical diagnosis of salpingitis by per-rectal palpation is difficult and inaccurate unless there is gross enlargement and thickening of the tubes with appreciable adhesion involving it. However, special techniques are required for the detection of minor abnormalities of oviducts which might result in unilateral or bilateral tubal occlusion and infertility (Johari and Sharma, 1964). Early diagnoses of these conditions are essential for suitable interventions for economic cattle rearing (Duchateau and Whitemore, 1978). Utero-tubal insufflations were used for the diagnosis and treatment of tubal disorders in bovines (Kavani, 1984). However, reports on the diagnosis of these affections by advanced diagnostic aids like ultrasonography and laparoscopy are scarce and the present study represents the use of these techniques for its confirmatory diagnosis.

History and Diagnosis:

A 10 year old crossbred Holstein Friesian cow, which calved eight months back, was presented at TVCC, Pookode with a history of chronic infertility. The animal had been exhibiting regular oestrous cycles and was inseminated several times but failed to conceive. On per rectal examination, bilateral thickening of oviducts with several cystic and nodular swellings at mesovarium and mesosalpinx could be palpated. Bilateral anechoic fluid filled structures at mesosalpinx were observed on real time B-mode transrectal ultrasonography (7.5 MHz), which was indicative of para-ovarian cysts. The oviducts

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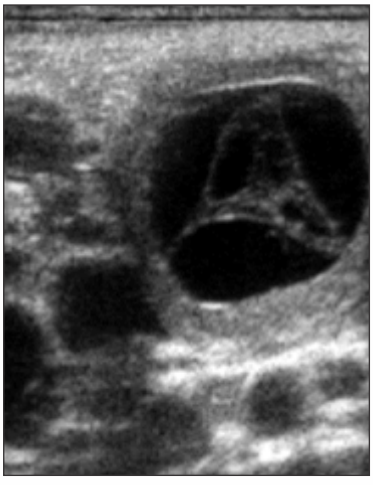
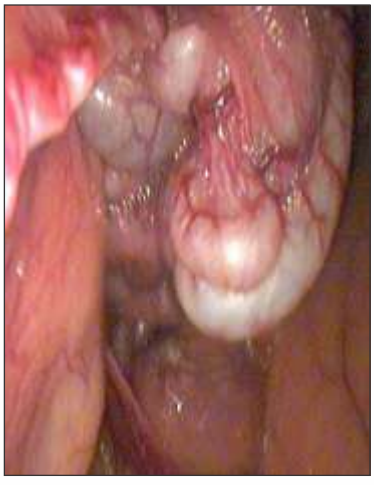
also contained anechoic fluid in the lumen with fibrin strands and the oviductal wall was found thickened. The animal was subjected to laparoscopic examination by inserting a trocar and 10 mm telescope through left flank as per standard procedures. In laparoscopic examination, ovarobursal adhesions with highly vascularised thickening of mesosalpinx, hydrosalpinx with inflammatory changes of oviducts were observed. The animal was slaughtered and the reproductive tract was subjected to gross examination for confirmatory diagnosis.

Ultrasonographic, Laproscopic and Post slaughtered Oviductal abnormality.


Discussion:

Salpingitis refers to the infection and inflammation of the oviducts in animals (Singh, 2009). The infection usually has its origin in the vagina which ascends to the oviducts. Because the infection can spread via lymph vessels, infection in either of the oviducts usually spreads to the other too. The gross abnormalities and lesions of the oviducts due to parity or infections were endosalpingitis, pyosalpinx, hydrosalpinx, occlusions, aplasia and other micro-lesions, which were not palpable per rectum could be responsible for reproductive failure in farm animals (Bhattacharya *et al.*, 1970). In an abattoir study on buffaloes, salpingitis was observed in 0.79% animals, which was 7.14 % of all the reproductive tract abnormalities (Mittal, 2003). However in repeat breeding cows, bilateral salpingitis was observed in 1.2% cases while unilateral inflammation was seen in 2% of animals. Hydrosalpinx and Pyosalpinx were detected, bilaterally in 1.6% and unilaterally in 2.8% genitalia (Khasatiya *et al.*,1999).Even though several techniques have evolved for detection of oviductal patency in humans, its adoption for accurate detection of bilateral affections of oviducts in farm animals found rather difficult. Mostly, post-mortem examinations of reproductive tracts only reveal the ovarobursal abnormalities than per rectal examination of the tract which causes huge economic losses. The present study revealed the clinical use of these diagnostic aids to detect oviductal affections in cows so that early diagnosis and culling of affected animals is possible which could reduce the financial loss to the farmers.

Conclusion:

The perrectal palpation, ultrasonographic examination, laparoscopic visualization and post slaughter examination of the reproductive tract confirmed the presence of parovarian cysts, nodular swellings and ovarobursal adhesions of mesosalpinx and bilateral salpingitis with accumulation of fluid in the lumen. Use of these advanced diagnostic aids are less time consuming and less invasive which could be adopted for earlier culling of infertile animals with oviductal abnormalities from the herd.

References:

Bhattacharya A. R., Luktuke S. N. and Roy D. J., (1970), The incidence of normal and pathological conditions of she-buffalo genitalia in different months, Indian J. Anim. Sci.**40**:425-427.

Duchateau A. B. and Whitemore H. L., (1978), Uterine tube abnormalities in cattle, J. American Vet. Medical Assoc.**172**: 1308-1309.

Johari M. P. and Sharma S. P., (1964), Fallopian tube lesion in farm animals. Diagnosis, Vet. Record. **76**: 293-294.

Kavani, F. S., (1984), Gynaecology, microbiology and histo-pathological investigation with therapeutically consideration in repeat breeder bovines. M.V.Sc. thesis, Anand, 125p.

Khasatiya C. T., (1997), Studies on tubal patency in abattoiral genitalia and in repeat breeding bovines.M. V. Sc. thesis, Gujarat agriculture University, India.

Mital D., (2003), Patho-haematological studies on the female genital organs of buffaloes (Bubalus bubalis), M.V.Sc. thesis, J. N.K.V.V. University, Jabalpur, 93p.

Singh J., (2009), Incidences of various etiological factors responsible for repeat breeding syndrome in cattle and buffaloes, The Internet J. Vet. Med., **6**: 220-223.

Metabolic and Mineral deficiency diseases of animals

Ketosis

- Disease of high yielding animals occurring within 3 months after parturition.
- Cause is disturbance in carbohydrate metabolism.

Clinical signs: Sudden drop in milk yield, refusal of concentrates, sweet smell to urine and milk, woody appearance, preferential anorexia and sometimes nervous signs.

Diagnosis: Rothera's test on urine/milk.

Treatment:

1) 25% to 50% glucose solution intravenously repeatedly.
2) Insulin 2 units/kg body weight subcutaneously.
3) Dexamthasone/ betamethasone

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Therapeutic Management of *Schistosoma* nasale Infection in Punganoor Cattle – A Case Report

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(received 11/03/2017 - accepted 13/06/2017)

Abstract:

This communication reports a case of successful treatment of Nasal Schistosomosis in a 8 year old Punganoor cow with Lithium anthiomaline thiomalate.

Keywords: Schistosoma nasale, Punganoor, Anthiomaline thiomalate.

Introduction:

Nasal schistosomosis (snoring disease) is caused by the blood fluke Schistosoma nasale (S. nasale) and is a snail borne trematode infection which resides in nasal veins of cattle, buffaloes and also in sheep, goat and horses in Indian subcontinent. It causes nasal granulomas and snoring disease among cattle, but only a subclinical infection among buffaloes. The main molluscan vectors, Lymnaea luteola and Indoplanorbis exustus, carry the larval form, Cercariae indicae (Singh, 2003). The zoonotic importance is considerable in view of the scope for dermatitis in man likely to be provoked by the cercaria of S. nasale in common water sources (Anantaraman, 1981). It was identified first in 1933 by Dr. M. Ananta Narayanan Rao at Madras Veterinary College, Tamil Nadu, India.

This blood fluke adversely affect health and production of cattle and serious outbreaks of disease caused by this species have been reported. Control of schistosomosis is based on control of the snail intermediate host and treatment of infected animal. The larval stages of Echinostoma sp. are predatory on schistosome larvae within the snail intermediate host (Soulsby, 1982). Present paper reports the therapeutic management of S. nasale infection in Punganoor cattle, Telangana, India.

Case history and Observation:

An eight years old punganoor cow was brought to Veterinary Dispensary, Koppole, Nalgonda with a history of bilateral mucopurulent nasal discharge with blood, anorexia, snoring, pale mucus membrane and high temperature [(101.3°F) Fig. no. 1]. Clinical examination revealed a pin head sized growth on the wall of the nasal mucosa. Subsequently, the nasal washings/nasal scrapings were taken in a test tube and 5 ml of 10 % potassium hydroxide was added. The contents were boiled for 3–5 min over flame for lysis of mucus. It was cooled and centrifuged at 2000 rpm for 3 min. After centrifugation, supernatant was discarded and the sediment was examined under low power of microscope showed boomerang shaped egg with terminal spineat one end called Schistosoma nasale (Fig. no. 2) as per Sumanth *et*

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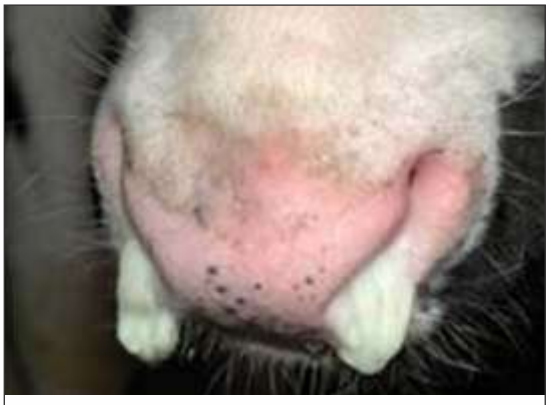

Fig 1: Bilateral muco purulent nasal Discharges

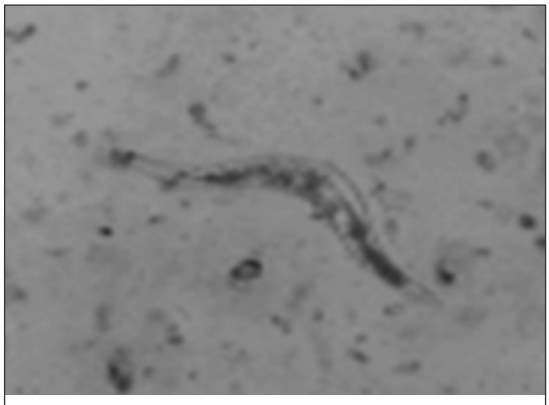

Fig. 2: Egg of *Schistosoma nasale* in nasal washing

al., (2004) with slight modifications.

Treatment and Discussion:

The animal was treated with Lithium antimony thiomalate (anthiomaline®) inj.6% w/v (Indian immunologicals) @ 4ml/total body weight-3 doses at weekly interval by deep intramuscular route. Supportive therapy like anti inflammatory drugs (inj. Anistamin®- 7ml, i/m), liver extracts (inj. Belamyl®-7ml, i/m) and rumenotorics (Ecotas bolus-2/day) mixed with jaggery was given.

The presence of boomerang shaped eggs in nasal scrapings of cattle was also reported by Sumanth *et al*. (2004) in Karnataka. Nasal schistosomosis in cattle and buffalo has been treated successfully with tartar emetic @ 2mg/kg body weight and sodium antimonyl tartrate @ 1.5 mg/kg body weight. Trichlorophon was also effective when a dose of 30-40 mg/kg body weight was repeated three times (Soulsby, 1982).

Anthiomaline was the drug of choice, but this leads to relapse of the symptoms after two months of the treatment. Praziquantel proved better than any other drug. Recently, Agrawal (2012) has successfully treated cases of nasal schistosomosis by administering triclabendazole at a dosage of 20 mg/kg body weight which appears a better alternative looking to cost of the treatment. Nevertheless, there are all chances of killing susceptible blood flukes by these less effective drugs resulting in existence of more resistant schistosome population in future generations causing more problems (Agrawal, 2012).

Acknowledgement:

The author is very thankful to Associate Dean for providing necessary facilities.

References:

Agrawal MC and Alwar VS, (1992), Nasal schistosomiasis: a review. Helm Abstr, **61**: 373–383.

Anantaraman M, (1981), The epizootiology of nasal schistosomiasis in animals, Proc Indian Acad Sci (Anim Sci), **90**: 659-63

Banerjee PS and Agrawal MC, (1992), Epizootiological studies in bovines on fluke infections with special reference to schistosomiasis, Indian Vet J. **69**: 215–220.

Rajamohan K and Peter CT, (1975), Pathology of nasal schistosomiasis in buffaloes, Kerala J Vet Sci, **6**:

94–100.

Ramachandra Rao PV and Indira Devi T, (1971) Nasal schistosomiasis in buffaloes, Indian J Anim Health, **10**(2): 185–188.

Singh KS, (2003) Veterinary helminthology, New Delhi: Indian Council of Agricultural Research, pp 113-115.

Soulsby EJL, (1982) Helminths, arthropods and protozoa of domesticated animals, 7 edi. London: Bailliere Tindall Ltd. Pp 79.

Sumanth S, D'Souza PE and Jagannath MS, (2004) A study of nasal and visceral schistosomiasis in cattle slaughtered at an abattoir in Bangalore, South India. Rev Sci Tech Off Int Epiz, **23**(3): 937–942.

Metabolic and Mineral deficiency diseases of animals

Downer's cow syndrome

- It is a special form of parturient paresis characterized by prolonged recumbancy even after 2 successive therapies of calcium boro-gluconate.

Symptoms:

Animal is bright and alert but unable to stand. It creeps and crawls. Appetite is usually normal. Later on lateral recumbancy and development of decubitus ulcers on hock and elbows and traumatic injuries.

Treatment:

Imperial treatment. Try to lift the animal with slings, provide soft bedding and turn position of the animal frequently.

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Theileriosis in A Calf and its Successful Treatment

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(received 09/02/2017 - accepted 11/05/2017)

Abstract : A male cow calf with the symptoms of anorexia, high fever, weakness, congested mucous membrane, moderate enlargement of superficial lymph nodes, dyspnoea and dullness was presented to Teaching Veterinary Clinical Complex. The case was diagnosed as a theileriosis on the basis of clinical symptoms and laboratory findings. The calf was treated with single dose of injection buparvaquone @ 2.5 mg/kg body weight along with the supportive therapy for 5 days. The case was completely recovered with restoration of appetite and other clinical parameters within 5 days.

Key words: Theileriosis, cow calf, haemoprotozoan

Introduction :

Theileriosis has been considered as a most important haemoprotozoan disease caused by *Theileria annulata spp.* It is transmitted through the bites of tick *Hyalomma spp.* Though, all breeds of cattle are susceptible to theileriosis, however, the incidence of disease is more common in exotic breeds and the crossbred cattle of all age groups and the young calves are also highly susceptible for Theileriosis (Grewal, 1992). Clinically, the disease is characterised by high fever, enlarged superficial lymph nodes , dullness, anorexia and reduced milk yield (Radostits *et al,* 2003). The present paper report the successful treatment of Theileriosis in a male calf.

Case history and clinical examination :

A 6 month old non-descript male calf was presented to Teaching Veterinary Clinical Complex, Post Graduate Institute of Veterinary and Animal Sciences (PGIVAS), Akola with the symptoms of anorexia, weakness and high fever (Fig. 1). Clinical examination revealed high fever (107 °F), congested mucous membranes, dull appearance, tachycardia with 105 beats/min., moderate enlargement of superficial lymph nodes, dyspnoea and presence of ticks on the body (Fig. 2). The case was suspected for haemoprotozoan infection. The blood sample was collected for confirmatory diagnosis. Microscopic examination of Giemsa stained blood smear showed presence of intra-erythrocytic *Theileria* organisms. Haematological examination revealed Hb 9.0 gm%, PCV 29%, TEC 3.5x 106/ µl, TLC 9.6x 103/ µl, Neutrophils 36%, Lymphocyte 55%, Monocyte 03% and Eosinophils 04%. On the basis of case history, clinical signs and laboratory findings, the case was diagnosed as Theileriosis.

Treatment and discussion :

Initially, the high fever (107 °F) was reduced with application of ice packs over the forehead of animal and administered injection Nimovet (Nimesulide) @ 4 mg/kg body weight. The body temperature was reduced to 102.5°F within few hours along with the heart rate 80 beats/min.

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Fig. 1 : Theileriosis infected calf

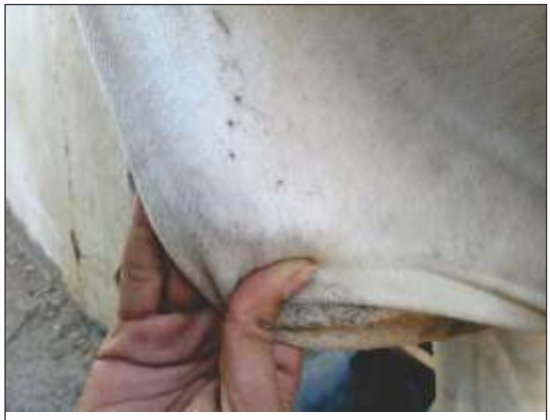

Fig 2 : Presence of Ticks on the body of animal

The case was treated with single dose of injection Zubion (Buparvaquone) @ 2.5 mg/kg body weight along with the supportive therapy consisting of injection Avilin (Phenaramine maleate) 3 ml IM, injection Belamyl (B-Complex with liver extract) 4 ml IM for 5 days. The animal was also administered a single dose of injection Hitek (Ivermectin) @ 0.2 mg/kg body weight SC so as to control tick infestation over the body. The calf showed marked improvement within next 2 days and recovered completely with restoration of appetite and other clinical parameters within 5 days. Subsequently, the blood smear examination revealed absence of *Theileria* parasites in erythrocytes, indicating the successful recovery of animal with given treatment.

In present case, the calf was treated successfully with single dose of injection Buparvaquone along with the supportive therapy. Several workers reported 93-100% efficacy of Buparvaquone against bovine Theileriosis (Vipan *et al.,* 2015, Verma and Singh, 2016). Simillarly, Gupta *et al.* (2004) and Ganga Naik *et al.* (2010) reported Theileriosis in young calves and its successful treatment with Buparvaquone along with supportive therapy. The present case study concludes that the Buparvaquone along with the supportive therapy could recover the case of Thieleriosis in calf.

References :

Bhanot, Vandna and Kamaldeep Mehla, O. P. (2014)Therapeutic management of bovine Theileriosis--a report of 13 cattle. *Intas Polivet,* **15**, (1):96

Ganga Naik, Ananda K. J. and Kavitha Rani B. (2010): Theileriosis in calves and its successful treatment, *Veterinary World,* **3** (4):191

Grewal, A. S. (1992): Development of theilaria vaccine for control of bovine tropical theileriosis. Proceeding Annual Scientist meet of All India Coordinated Research Projects on Intracellular blood protista with special reference to the immunoprophylaxis and control' held on Feb. 8, 1992 at Haryana Agricultural University, Hisar, India.

Gupta, S. K., Anish Yadav, Raina, A. K. And Rajiv Singh (2004): Theileriosis in a seven-day old bovine calf- a case report, *Indian J. Vet. Med.* **24**: 55

Radostits, O. M., Gay, C. C., Blood, D. C. and Hinchcliff, K. W. (2003) Veterinary Medicine : A Textbook of Cattle, Sheep, Pigs, Goats and Horses. 10th

Edn. Book Power Formerly ELST London,: 1324-1328.

Sarma, G. V. K., Reddy, S. U. M., Subrahmanyam, P., Murthy, S. S., Rao, T. M. And Krishna, P. G. (2008) Therapeutic Management of Bovine Theileriosis, *Intas Polyvet,* **9**:64.

Sharma, R. D. and Nichani, A. K. (1990): A cell culture vaccine against bovine tropical theileriosis even in for young calves. Proceeding first Asian Congress of Veterinary Parasitology, held from October 6-8, 1990, Bihar Veterinary College, Patna, India.

Sumathi, B.R. and Veena, M.P. (2012) Bovine Theileriosis in Crossbred Cattle, *Indian Vet. J.,* **89** (12): 83-84

Verma, A. K. and Singh, S. K. (2016) Control and therapeutic management of bovine tropical theileriosis in crossbred cattle. *J Parasit Dis.* **40** (1):208-10

Vipan K, Parvinder K, Heigo P, Hanish S, Vinay MW, Charanjeet S, Gagandeep B. (2015)Theileriosis in Crossbred Cattle: Therapeutic Management and Control, *Annals of Veterinary and Animal Science,* **2**(2): 20-22

Metabolic and Mineral deficiency diseases of animals

Post parturient hemoglobinuria

- This disease is characterized by red urine and it occurs 2 to 4 weeks after parturition.
- Its cause is deficiency of inorganic phosphorous.

Symptoms:

Hemoglobinuria, severe weakness, depression, pale mucus membranes, pulsation of jugular vein and sometimes jaundice.

Treatment:

20% sodium acid phosphate 200-300 ml intravenously along with same dose subcutaneously. Repeat subcutaneous dose 12 hourly on 3 occasions along with 60 gm of sodium acid phosphate orally daily.

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Non Surgical Management of Dystocia Due to Torsion Along With Foetal Mal-presentation In A Buffalo - A Case Report

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(received 08/02/2017 - accepted 10/05/2017)

Abstract :

This communication reports a case of successful management of dystocia due to 180 degree left side uterine torsion and fetal abnormal presentation in a pluriparous Murrah graded buffalo, and delivery of live female calf with modified Schaffer's method.

Keywords : dystocia, torsion, pluriparous, mal-presentation, modified Schaffer's method.

Introduction :

Difficulty in parturition is called as dystocia. The obstetrical condition requires immediate attention by the veterinarians. The causes of dystocia are fetal and maternal causes or both. Dystocia is caused by fetal abnormalities and mal-presentations, among the maternal causes poor body condition and uterine torsion leads to dystocia. Bovines are the most commonly affected species with dystocia, Incidence of dystocia in buffaloes is 0.70-6.3%. Uterine torsion is considered to be the largest condition contributing to dystocia in buffaloes with incidence as high as 56% to 67% and upto 70% (Nanda *et al.,* 2003). It is observed commonly in pluriparous animals at the time of parturition or during the last month of gestation (Roberts., 1986).In field condition torsion is generally diagnosed at the time of calving when animal finds difficulty in parturition.

The most common treatment methods for the correction of uterine torsions in buffaloes are mutational procedures, fetotomy, forced extraction and cesarean section. In this case we used modified Schaffer's method. Prognosis also depends on the severity of the torsion and the severity of the symptoms. In case of complete torsion in field without the veterinary help it is always grave.

Case History and Clinical Observations:

A primiparous Murrah graded buffalo was presented with a history of full term pregnant and showing straining for last 24 hours. Animal was showing symptoms of abdominal pain, lying down and standing up, kicking etc relaxation of broad ligament. On clinical examination, pulse and respiration rate was observed lower and temperature was normal. Per-rectal examination revealed more than 180 degree left side uterine torsion, on per-vaginal examination no fluid was seen and os-cervix could not be palpated.

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Figure 1

Figure 2

Obstetrical Management and Discussion :

Before starting procedure, 6 ml dexamethasone (Marcodex) and 2 ml of cloprostenol was injected intra muscularly to the buffalo. Animal was casted after securing its all the limbs in field, one end of a wooden plank of 8 feet was placed on the abdomen of the animal with one assistant on the plank (for pressure) keeping another end on ground. Animal was rolled in the direction of torsion as per Modified Schaffer's method (Prakash and Nanda., 1996; (Figure 1) After two rolls, foetus was accessible but was in anterior upside-down position with right lateral deviation of head. After thorough lubrication of the birth canal with liquid paraffin, the fetal position and posture were corrected by repulsion, version and adjustment of extremities. Snares were applied on both limbs and lower jaw, All the snares were applied simultaneous traction (pulled out) in a outward direction and a healthy female fetus was delivered (Figure 2). Nostril area of calf was cleaned with towel. Dam was treated with Calcium borogluconate toghether with Magnesium & Phosphrous in organic combination and dextrose (Mifex) 450 ml and Sodium Acid Phosphate (T. Phos) 10 ml slow intravenously on first day along with Ceftriaxone (Intacef) @ 10mg/kg body weight (3g), Meloxicam (Melonex) @ 0.5 mg / kg body weight (20 ml) with Vitamin B complex (Tribivet) 15 ml daily for five days animal was also advised for Proshe a herbal uterine tonic. On the next day the animal normally expelled the placenta without further complications.

Conclusion :

Dystocia due to torsion along with foetal abnormal presentation can be relived successfully with the help of Modified Schaffer's method, even under field condition..

Reference :

Ahmad, N., (2001), Reproduction in the buffalo, p. 789-799. In Noakes, D.E., Timothy J. Parkinson, Gary C.W. England (eds.) Arthur's Veterinary Reproduction and Obstetrics. W.B. Saunders Company, Philadelphia.

Nanda, A.S., Brar, P.S. and Prabhakar, S., (2003), Enhancing reproductive performance in dairy buffalo: major constraints and achievements. Reproduction Supplement, **61**, 27-36.

Pattabiraman, S.R., Singh, J., Rathore, S.S., et al., (1979), Non surgical method of correction of bovine uterine torsion-A clinical analysis. *Indian Veterinary Journal,* **56**, 424-428.

Prakash, S. and Nanda, A.S., (1996), Treatment of uterinetorsion in buffaloes-modification of Schaffers method. *Indian Journal of Animal Reproduction,* **17**, 33-34.

Roberts, S.J., (1986), Diseases and accidents during the gestation period, p. 230-233. In Roberts, S.J. (ed.) Veterinary Obstetrics and Genital Diseases (Theriogenology). Woodstock, VT

Sane, C.R., Luktuke, S.N., Deshpande, B.R., et al., (1982), Reproduction in Farm Animals. Varghese Publishing House, Bombay, India.

Metabolic and Mineral deficiency diseases of animals

Lactation tetany

- Lactation tetany is more common in mares than in cows.
- This disease occurs in first 2 months after parturition and is more common in the age group of 4 to 7 years.
- It is characterized by convulsions and muscular spasms.

Clinical signs:

Unusual alertness, twitching of muscles and ears, hyperesthesia, staggering, opisthotonous, nystagmus, champing of jaws and frothing at mouth.

Treatment:

20 % magnesium sulphate 200-300 ml intravenously. A combination of 12% magnesium adipate and 5% calcium gluconate can be given @ 500 ml intravenously.

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Dystocia Due to Dicephalus Atlodymus Polymelia Foetus in Murrah Buffalo

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(received 31/03/2017 - accepted 30/06/2017)

Abstract :

A Murrah buffalo with dystocia was presented to clinics and diagnosed as dystocia due to foetal monstrocity. Ceaserian section was performed and foetal monster of dicephalus atlodymus with polymelia was removed successfully .

Key words: Buffalo, Foetal dystocia, Dicephalus, Atlodymus, Polymelia.

Introduction :

Foetal anomalies and monstrosities are most common cause of dystocia in bovines. Foetal monstrosities often cause dystocia in farm animals (Bugalia, *et al.,* 1990). Dicephalus atlodymus is a foetal malformation in which the foetus possess two complete and separate skulls attached with single neck. The present case report describes a case of dystocia due to dicephalus atlodymus with polymelia monster.

History and Observations :

A 6 year old pluriparous Murrah buffalo was presented to Teaching Veterinary Clinical complex, PGIVAS Akola with history of dystocia. As per the history, water bags were ruptured 10 hrs before and buffalo was straining without any progress. Per vaginal examination revealed that the dead foetus was in anterior longitudinal presentation with two separate heads with single neck. Since the dystocia was for last 10 hrs and there was contraction of uterine cornua on foetus as well as due to foetal monster, it was decided to perform ceaserian section to relieve the dystocia.

Fig- 1. Dicephalic Atlodymus polymelia fetus

Treatment and Discussion :

Ceaserean section was performed by paramedian incision on abdomen in recumbent position. Following Ceaserian section, the foetal monster with two separate haeds (Dicephalic) with single neck (Atlodymus) and four hind limbs (polymelia) was removed (Fig-1). Both the heads were nearly of same size and with normal structures. Any factor responsible for incomplete separation of primitive streak after 13 days of fertilization is considered as etiological factor for congenital duplication (McGirr et al.,

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1987). Similar type of monstrosities were reported by Bakshi *et al.,* (1992) in crossbred cow, whereas Adsul *et al.,* (1992) recorded duplication of thorasic part in dicephalic monster in a Dangi cow.

References

Adsul, P. B., Velhanker, R. D and Dhande, P. L., (1992), Dicephalic dicardiac monster in Dangi cow. Indian J. Anim. Reprod., **13**: 201-202.

Bugalia, N. S., Chandolia, R. K., Verma, S. K., Singh, P. and Sharma, D. K., (1990), Monstosites in buffaloes and cows. Indian Vet. J., **67**:1042-1043.

McGirr, W. J., Partlow, G. D. and Fisher, K. R., (1987), Dicephalus-biatlanticus monster in a buffalo. Indian J. Anim. Reprod., **21**(1): 81.

Bakshi, S. A, Tandle, M. K., Aher, V. D., Goswani, J. D., Moregaonkar, S. D. and Deshmukh, A. A., (1992), Dicephalic monster in a crossbred cow. Indian J. Anim. Reprod., **13**:93.

Metabolic and Mineral deficiency diseases of animals

Iron deficiency

- Iron deficiency is common in piglets.
- Milk is poor source of iron.

  Access to earthen yard provides sufficient iron to overcome deficiency of iron in dams milk.

Clinical signs of iron deficiency include weakness, anemia and paleness of mucosae.

Treatment:

Iron dextran injections and feeding of jaggery.

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Intra-luminal intestinal obstruction due to areca nut in a Rottweiler

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(received 30/08/2017 - accepted 05/10/2017)

Abstract:

A case of intra-luminal intestinal obstruction due to radiolucent foreign body, areca nut in a Rottweiler, its diagnosis and successful surgical management is placed on record.

Keywords: Intestinal obstruction, intra-luminal, foreign body.

Introduction

Intra-luminal intestinal obstruction due to ingestion of choke belts, stones, plastics, bones, fish hook, needle, toys, bottle caps etc have been reported in dogs (Hayes, 2009). The initial signs of obstruction may not be specific which usually makes diagnosis difficult. Survey radiograph often reveals ileus as a result of complete obstruction and radiopaque foreign bodies (Hedlund and Fossum, 2007). But, in case of radiolucent foreign bodies, further diagnostic evaluation may be necessary. This paper reports the intra-luminal obstruction of jejunum due to areca nut in a dog and its successful surgical management.

Case History and Observations

An eight month old male Rottweiler was presented to the Referral Veterinary Polyclinic, with the complaint of vomiting and anorexia for the past five days and passing scanty faeces for the past three days. On clinical examination, the animal was dull and depressed. The physiological parameters were normal. A hard mass could be felt on palpation of mid abdominal region. Survey radiograph of the lateral abdomen revealed the presence of gas filled loops of small intestine (Fig. 1). On contrast radiography, accumulation of barium was noticed at the level of small intestine in addition to the retention of contrast agent by radiolucent foreign body (Fig. 2). Haematology showed mild leucocytosis with neutrophilia. Based on history, clinical signs and radiographic findings, the condition was diagnosed as intra-luminal intestinal obstruction due to foreign body.

Treatment

Surgical removal of foreign body was done under general anaesthesia. The dog was stabilized pre-operatively by 5% dextrose normal saline (DNS)

Fig. 1: Plain radiograph showing gas filled loop of intestine

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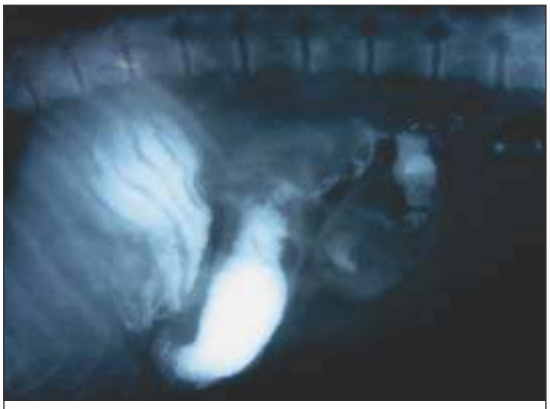

Fig. 2: Contrast radiograph showing accumulated barium at the level of small intestine and retention of barium by radiolucent foreign body

and Ringer's Lactate (RL) IV. The animal was premedicated with atropine sulphate (Atropine sulphate, 1mg/ml, Priya Pharmaceutical, Kanpur) @ 0.045 mg/kg BW SC followed by pentazocine (Fortwin, 30 mg/ml, Ranbaxy Laboratories Ltd., Ahmedabad) @ 1 mg/kg BW and diazepam (Calmpose, 10 mg/2 ml, Ranbaxy laboratories Ltd., Baddi) @ 0.5 mg/kg BW IV. The animal was prepared aseptically and was positioned for ventral midline laparotomy. Anaesthesia was induced with 5% thiopentone sodium (Thiosol sodium, 500mg, Neon Laboratories Ltd., Mumbai) @ 10 mg/kg BW IV and was maintained by 2% isoflurane (Forane, 250ml, Abbott Laboratories Ltd., Kent, United Kingdom) in oxygen. Following laparotomy, the intestinal loop with the foreign body was exteriorized and the site of obstruction was found to be jejunum. A 2 cm long longitudinal incision was made on the anti-mesenteric border of the intestine slightly aboral to obstruction and the mass was exteriorized. The mass was found to be areca nut (Fig. 3). The enterotomy wound was sutured in Cushing's pattern followed by Lembert's using 2-0 USP polyglactin 910 (Relyon Glactin, MCo Hospital Aids Pvt. Ltd., Hubli). The abdomen was closed in simple interrupted pattern using 1-0 USP Polyglactin 910. Finally, the skin was apposed in horizontal mattress pattern using polyamide (Ethilon, 90 cm, Johnson and Johnson Ltd., Aurangabad). Post-operatively, food was withdrawn for 72 hours and the animal was maintained on parenteral fluids. Ceftriaxone sodium (Intacef, 500 mg, Intas Pharmaceuticals Ltd., Ahmedabad) @ 25 mg/kg BW was given IV for seven days. Animal was allowed to take water and liquid diet from 4rth post-operative day and solid food from 7th post-operative day. The animal had an uneventful recovery and the skin sutures were removed on the 9th post-operative day.

Discussion

Intestinal foreign bodies are a serious threat since they cause severe damage to the intestine leading to persistent vomiting, loss of gastric secretions and electrolyte imbalance. Foreign bodies that traverse oesophagus and stomach may lodge in the intestine which is smaller in diameter particularly in jejunum with about 63% incidence (Hayes, 2009). Foreign bodies lodged in the intestine cause ulceration, haemorrhage, anorexia, dehydration, perforation and

Fig. 3: Exteriorized areca nut

peritonitis and if not treated at the earliest may result in death (Hedlund and Fossum, 2007). Prognosis is usually good after removal of foreign body (Hayes, 2009). If timely intervention is not done, enterectomy and enteroanastomosis will be the sequel.

In the present case, survey radiograph was unable to detect the foreign body as it was radiolucent. Contrast radiograph confirmed the presence of foreign body and was correlated with leucocytosis and neutrophilia similar to the observations made by Singh *et al*. (2011). The enterotomy wound was closed in inversion suture pattern as described by Deveney and Way (1977) even though; simple interrupted or simple continuous suture pattern is the ideal technique for closure of enterotomy wounds. Timely diagnosis and surgical removal of foreign body along with post-operative care led to uneventful recovery of animal.

Reference

Deveney, K. E. and Way, L. W. (1977). Effect of different absorbable sutures on healing of gastrointestinal anastomosis. Am. J. Surg. **133(1)**: 86-94.

Hayes, G. (2009). Gastrointestinal foreign bodies in dogs and cats: a retrospective study of 208 cases. J. Small Anim. Pract. **50(11)**: 576-583.

Hedlund, C.S. and Fossum, T. W. (2007). Surgery of the digestive system: In Small animal surgery. Ed. Fossum, 3rd edition, Elsevier, Philadelphia, USA. pp: 339-530.

Singh, G. D., Jadon, N. S. and Sharma, V. K. (2011). Pathophysiological alterations in acute abdomen due to intestinal obstruction in dogs. Indian J. Vet. Surg. **32(11)**: 48-50.

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Dystocia Due to Dicephalus Craniopagus Fetus In a Buffalo and Its Delivery by Partial Fetotomy

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(received 07/06/2017 - accepted 10/09/2017)

Abstract:

Dystocia in an multiparous Murrah buffalo with dicephalus craniopagus foetus with cleft palate was delivered per-vaginally by partial fetotomy and followed up to post-partum fertility.

Keywords: Dicephalus, Conjoined twin, Fetotomy, Buffalo

Introduction:

Fetal anomalies and monstrosities of different types with varying degrees have been recorded in cattle (Roberts, 1971) but incidence is rare in buffaloes (Bugalia *et al.*,2001). Conjoined twins arise from a single ovum and are monozygotic. Hancock (1954) and Arthur (1956) recorded a lower incidence, suggesting occurrence of conjoined twins about 1in1,00,000 bovine births. Fetotomy is a better choice for delivery of monstrous fetuses in large animals by reducing the size of fetus and preventing the injury to genital passage. It avoids caesarean section and reduces the time required for recovery by the animal without compromising the future fertility (Roberts, 1971). Present report is a typical case of dystocia due to dicephalus craniopagus (conjoined twin) fetus in a multiparous buffalo.

Case History:

A Murrah buffalo, with full term pregnancy in fourth parity was presented to the OPD of Dept. of VGO, Veterinary college, Bidar with history of non-progressive straining for 7-8 hours with ruptured allantois 4 hours earlier. The case was unsuccessfully tried by a local para-veterinarian with forced traction. It had a peak production 4 L/milking in the previous lactation and conceived in 2nd insemination in her 6th month post-partum oestrus.

Clinical Observation and Treatment:

On arrival, animal was recumbent and rectal temperature was normal (100.2^{0}F) with slightly increased respiration rate and tachycardia. On gynaeco-clinical examination, fully dilated cervix with foetus in anterior longitudinal presentation, dorso-sacral position, with both forelimbs extended into the birth canal and duplicated, conjoined head, one of head in the passage, without any further progress in parturition was revealed.

After careful examination of passage and the fetus, under low epidural anaesthesia (Lignocaine, 2%) with proper lubrication (CMC gel),one of its loop was passed around the neck, starting from ventral aspect of head, forcing it around the neck, towards opposite side and finally taking out the rope carrier from dorsal

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Fig. 1: Dicephalic fetus delivered per-vaginal by partial fetotomy.

side, making a loop around the neck just at the level, posterior to ears. The rope carrier was removed and free end of wire passed through other barrel of Thygeson`s fetotome, sawing was carried out to cut the conjoined head. After the cut, fetal head was removed first and then remaining part of fetus was delivered with manual traction covering the cut ends with palm. The routine supportive therapy consisting of antibiotic, analgesics, anti-inflammatory drugs and intravenous fluids was given for five days and the animal recovered uneventfully.

On examination, fetus had two heads which were conjoined (Dicephalus, craniopagus), with normal eyes, ears and cleft palate, two fore legs and two hind legs, single tail (Fig. 1). So, it was classified as Dicephalus craniopagus fetus with cleft palate (Roberts, 1971).

Discussion:

These are non-inherited teratogenic defects derived from monozygotic embryos. Monstrosities arise due to incomplete division of embryo into components, usually at the primitive streak during the development stage (Noden and Lahunta,1984). Duplication at cranial part of fetus were more common than that of caudal parts (Roberts 1971). Dicephalus is a malformation of head resulting from incomplete twinning in animals (Jenkins and Hardy, 1968). Dicephalus foetuses with varying degree of duplications of other parts can be relieved by either mutation and forced traction (Chandrahasan *et al.*, 2003, Ravikumar *et al.*, 2012a) or caesarean section (Ravikumar *et al.*, 2012b). The present case was relieved by partial fetotomy followed by forced traction, successfully. Further, follow up of the case revealed that the buffalo conceived in her second estrus at 6th month post-partum indicative of good fertility following fetotomy.

References:

Arthur, G.H., (1956), Conjoined and identical twins. Vet Rec.,**68**:389.

Bugalia, N.S., Biswas, R.K. and Sharma, R.D., (2001), Dicephalus monster in an Indian water buffalo (Bubalus bubalis). Indian J. of Anim. Reprod., **22**(2);196-197.

Chandrahasan,C., Krishnakumar, K., Selvaraju, M., Richard,Jagatheseen, P. N., and Ramesh Saravanakumar, V., (2003.), Dystocia due to Dicephalus monostomus monster in a cross bred cow. Indian J. Anim. Reprod.,**24**:175.

Hancock, J., (1954), Monozygotic Twins in cattle, in Advances in Genetics 6, 141, Academic Press, Inc.,N.Y.C.

Jenkins, T.W.andHardly, P.H., (1968), Diprosopus and related cephalic malformations in a calf. Anat. Rec.**160**:161-169.

Noden, D.M. and Lahunta, A. D., (1984), The Embryology of Domestic Animals –Developmental mechanisms and malformations, 1st Ed., Williams and Wilkins, Baltimore, London.

Ravikumar, K., Krishnakumar, K., Ezakial Napolean, R., and Chandrahasan, C., (2012a), Per vaginal delivery of a Dicephalus dicaudatus xiphopagus monster. Indian J.Anim.Reprod.,**33**:(2);96-97.

Ravikumar, K., Krishnakumar, K., Kumarasen, A., and Chandrahasan, C., (2012b), Dystocia due to Dicephalusmonostomus monster in a jersey cross bred heifer. Indian J. Anim. Reprod.,**33**:2 94-96.

Roberts. J., (1971), In Veterinary Obstetrics and Genital Disease 2nded C.B.S publisher and distributor, Delhi; pp70-77.

Metabolic and Mineral deficiency diseases of animals

Iodine deficiency

Iodine deficiency is characterized by goitre, neonatal mortality, alopecia, loss of libido in bulls, anoestrous and prolonged gestation period.

Treatment:

Weekly application of Tr. iodine to flank (4 ml in cattle and 2 ml in sheep, goat and pig). Provide iodine through mineral mixture.

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Therapeutic Management of Ruminal Tympany in a Goat

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Abstract :

An eleven month old male goat weighing 10kgs was presented with the history of inappetance, distended abdomen, respiratory distress and diarrhoea. Clinical examination of animal revealed pyrexia (104^{0}F), increased respiration (60/min), pulse rate (100/min), and decreased rumen motility (2/5min). Ruminocentesis was performed to relieve accumulated gas in the rumen and treated successfully with antihistaminics, B-complex vitamins and rumen buffers.

Keywords: Tympany; goat; ruminocentesis and treatment.

Introduction

Bloat or tympanitis is an emergency condition of ruminants, mostly seen in cattle and buffalo but less in sheep and goat (Das *et al*., 2011). An abundance of rapidly fermented carbohydrate allows acid-tolerant bacteria (e.g., Streptococcus bovis and Lactobacillus spp.) to proliferate and produce excessive quantities of fermentation acids. As a result, ruminal pH becomes exceedingly low impairing rumen motility. Further, an excessive production of mucopolysaccharide or "slime" increases the viscosity of ruminal fluid (Cheng *et al*., 1998). Bloat may be categorized into two types based on the type of gas, one is frothy bloat and other one is free gas bloat. Frothy bloat is caused by the formation of stable foam in the rumen, where as free gas bloat formation is because of two reasons either due to excessive production of gaseous compounds from fermentation or due to an obstruction of escape of gas compounds from rumen. Chronic ruminal tympany may be of frothy type because of ruminal hyperactivity (Rodostits *et al*., 2007).

History and Clinical Examination

An eleven month old male goat weighing 10kgs was presented to campus Veterinary Hospital, College of Veterinary Science, Rajendranagar with history of distended abdomen (Fig. 1), gasping, respiratory distress and diarrhoea. The owner revealed that, the goat was fed on vegetable market waste and later developed inappetance and deprived appetite. Clinical examination of the goat revealed pyrexia (104^{0}F), increased respiration (60/min), pulse rate (100/min), and decreased rumen motility (2/5min). Upon percussion of left paralumbar fossa, tympanic sounds were heard.

Materials and Methods

Site was selected for ruminocentesis at left paralumbar fossa, which was located 12 to 15 cm caudal to the costochondral junction of the

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Fig. no. 1 Goat with distended abdomen

last rib, on a horizontal line level with the top of the patella . The site was shaved, disinfected (scrubbing with povidone-iodine and disinfection with 70% Ethanol) and ruminocentesis was performed using 18 gauge, 120 mm long, stainless steel needle, which released large quantities of gas and further there was a subsidence of the rumen distention. 5-10 ml of ruminal fluid was aspirated with a 20 ml syringe. When a sufficient volume of ruminal fluid was obtained, a small volume of air was forced through the needle. Finally, the needle exit site was wiped with povidone-iodine (Tajik *et al.*, 2011). Clinical examination of goat was performed as per procedure described by Kelly (1979), and rumen fluid was collected and analyzed (Rosenberger *et al.*, 1979). The goat was treated with injection Tribivet@ 1ml intra muscularly once daily for 5days, injection Anistamin@1ml intramuscularly once daily for 5days, injection Meloxicam@1ml intramuscularly, Tyrel suspension@ 10ml, and Bufzone@20gms was administered orally.

Results and Discussion

Clinical examination of the affected goat revealed pyrexia (104^{0}F), increased respiration (60/min), pulse rate (100/min), and decreased rumen motility (2/5min). Upon percussion of left paralumbar fossa tympanic sounds were heard. Rumen fluid collected was greyish green in color with foamy consistency, decreased pH, increased sedimentation activity, increased viscosity, and increased production of bubbles. The present clinical findings were in agreement with Ismail *et al.*, (2007).

Bloat is abnormal distention of rumen and reticulum caused by excessive retention of gases of fermentation, either in the form of persistent foam mixed with rumen contents or as free gas separated from the ingesta (Rodostits *et al.*, 2007). Bloat results from the accumulation of gas in the rumen. Normally, gas produced during fermentation of feed rises through the rumen contents and forms a gas pocket in dorsal sac. Continued accumulation of gas within rumen increases the pressure and eventually causing death by diaphragm and lungs (Dougherty, 1956a). In the present case the diagnosis was made on basis of history of feeding and clinical signs.

After ruminocentesis, there was reduced distension and marked relief to the goat. After treatment for five days the animal regained its appetite, reduction in temperature, reduction in distention of abdomen, normal breathing, and normal rumen motility, normal defecation in agreement with Ramasamy *et al.*, (2015).

Tympanyl can be used in the treatment of bloat in sheep (Graham Bailey, 2014). Oral administration of tyrel along with other supportive therapy like vitamin B-complex

injections, and rumenotorics produced a significant improvement in restoration of normal rectal temperature, ruminal motility and relief from distention of left side abdomen (Ramasamy *et al.*, 2015). Methyl silicone, a defoaming agent was effective treatment for bloat (Dougherty, 1956b).

Conclusion

Bloat or tympanitis in 11 month old male goat weighing 10kgs was relieved through ruminocentesis as an emergency aid. In the present study, affected goat responded well with vitamin B-complex injections, antihistaminics, and rumen buffers and complete recovery was seen after one week.

References

Bailey, G., (2014), Bloat in cattle and sheep. NSW Department of Primary Industries, p.2.

Cheng, K. J., McAllister, T. A., Popp, J. D., Hristov, A. N., Mir, Z., & Shin, H. T., (1998), A review of bloat in feedlot cattle. Journal of Animal Science, **76**(1), 299-308.

Das, J., Behera, S. S., Pati, S., (2011), Acute bloat in a goat and its surgical management by rumenotomy. Intas Polivet, **12**(2), 322-324.

Dougherty, R. W., (1956a), Bloat in ruminants. US Department of Agriculture Yearbook of Agriculture, 108-1113.

Dougherty, R. W., (1956b), Physiology of the rumen as related to bloat. A review of bloat in ruminants. NAS-NRC publishers, 388.

Ismail, Z. B., Al-Majali, A., & Al-Qudah, K., (2007), Clinical and surgical findings and outcome following rumenotomy in adult dairy cattle affected with recurrent rumen tympany associated with non-metallic foreign bodies. The American Journal of Animal and Veterinary Sciences, **2**(3), 66-71.

Kelly, W.R., (1979), Veterinary Clinical diagnosis. 2nd Ed. Baillierl Tindal, (London).

Ramasamy, S., Ganapa, S., Marimuthu, S., & D'Souza, P., (2015), Evaluation of Ayurvedic Veterinary Medicine, Tyrel® for treatment of bloat in ruminants. International Journal of Agricultural Sciences and Veterinary Medicine, p.1.

Rosenberger, G., Dirksen, H. D., Grunder, E., Grunert, D., Krauze, M., and Mack, R., 1979, Clinical examination of cattle. 2nd ed. Verky paulparay, Berlin, Humburg, Pp.203-209.

Rodostits, O.M., Gay, C.C., Hinchcliff, K.W., Constable, P. D., (2007), Veterinary Medicine. A Textbook of Diseases of Cattle, Horses, Sheep, pigs and goats 10th Edn., WB Saunders, USA, 325-336.

Tajik, J., Nadalian, M. G., Raoofi, A., Mohammadi, G. R., & Bahonar, A. R., (2011), Evaluation of rumenocentesis practicability as a routine diagnostic technique in veterinary practice. Veterinarski arhiv, **81**(5), 557-561.

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Management of Nasal bots and concurrent Gastrointestinal parasites in a sheep farm

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Abstract:

The present study documents nasal bots and concurrent gastrointestinal parasitic infestation in a sheep farm and successful therapeutic management with parasiticides.

Keywords: Gastrointestinal parasites;Sheep nasal bots; therapeutic management with parasiticides.

Introduction:

The sheep nose bot fly, *Oestrus ovis*, is a cosmopolitan parasite that, in its larval stages, inhabits the nasal passages and sinuses of sheep and goats but do not cause significant problems and owners are usually unaware of their presence. The female deposits larvae (Nasal bots) in and about the nostrils of sheep without alighting. These small, clear-white larvae (initially <2 mm long) migrate into the nasal cavity; many spend at least some time in the paranasal sinuses. The larval period, which is usually shortest in young animals, lasts 1-10 months (Sloss *et al.*, 1994). The rate of development of larvae within the sheep's head is highly variable and can take as long as ten months or as little as six weeks. Expelled bots form pupae in the soil and flies emerge from these after a few weeks (Kimberling, 1988).

Larvae present in the sinuses are sometimes unable to escape; they die and may gradually become calcified or lead to a septic sinusitis and the possibility of death from general septicaemia. Migration of the larvae irritates the nasal membranes and is often followed by secondary infections (Pimentel, 1981). Infested sheep shake their heads, stamp their feet, or hold their noses to the ground. Sneezing and labored breathing can be common among infested sheep. Blood flecks in the nasal discharge, and sheep banging their heads against feed bunks, fences, or the ground indicate the presence of nose bots (Kimberling, 1988). Severely infested, older, or weak sheep may die as a result of the bots. The larvae develop during the winter; the following spring they are sneezed out or drop out to the ground, where they pupate and become adults.

Fig. 1: Tape worm (*Moniezia expansa* ~ 7 mts in length) from the carcass of sheep

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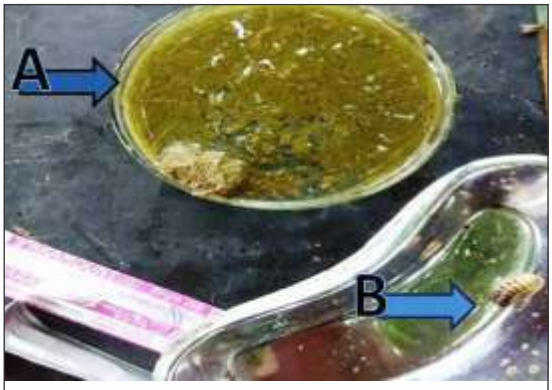

Fig 2: Hemonchus worms (A) from abomasum and nasal bot (B) from nasal sinuses

Haemonchus contortus, also known as the barber's pole worm, is very common parasite and one of the most pathogenic nematodes of ruminants. *Moniezia expansa* is a large tapeworm inhabiting the small intestines of ruminants such as sheep, goats and cattle(Sloss et al., 1994).

History and clinical observation

A sheep farm in West Godavari district of Andhra Pradesh, on semi-intensive farming, was reported to be having mortality and carcasses were presented for the post mortem examination. The PM examination revealed nasal bots in nasal sinuses (Fig 2) and gastro-intestinal parasites (both *Hemonchus contortus* and *Moniezia expansa* sps (Fig 1) with edematous abomasum. Mortality was reported in the lactating ewes of the farm.

At farm, sheep were running from place to place, keeping their nose close to the ground, sneezing and shake their head (Fig 3). Especially during the warmer hours of the day. In some sheep a profuse clear and mucoid discharges were noticed in nasal passages and some sheep had shown mucopurulent discharges tinged with fine streaks of blood. Other clinical signs included pallor, anemia, oedema, diarrhea, ill thrift, lethargy and depression. Growth and production were significantly reduced.

Treatment:

Neomeca (Ivermectin) at 200 mcg/kg SC, has been used for nasal bots and Hemonchosis at one week interval for thrice and Panacur Vet tablets[b] (Fenbendazole)@ 150 mg per 30 kg b.wt PO) for tape worm infestation and Sharkoferrolvetc for anaemia (5 gm per animal PO for two weeks). Treatment had been continued until fecal examinations of random samples shown negative for parasitic eggs. No mortality was recorded after treatment and general condition of the sheep was improved.

Discussion:

In the present case study mortality and reduced growth rates were caused by concurrent infections of gastrointestinal parasites and nasal bots. The sheep nasal bot fly deposits larvae, not eggs, on its host, unlike the related bot fly of horses (Gasterophilus species) which attaches eggs to horse hair (Pimentel, 1981). Sheep are the principal hosts. There is no commercially available test which will identify infected sheep. The flies themselves are a little smaller than the common blow fly but are rarely seen. The peculiar behavior of sheep when the bot flies are

Fig 3: sheep may run from place to place, keeping its nose close to the ground, sneeze and stamp its feet, or shake its head in Nasal bots' infestation

active (to avoid the fly's attempts at larval deposition, a sheep may run from place to place, keeping its nose close to the ground, sneeze and stamp its feet, or shake its head) may indicate that some sheep in the flock are likely to become infected(Lloyd, 1985). A nasal discharge, with or without coughing and sneezing, would arouse suspicion but is not diagnostic for nasal bot infestation (Kimberling, 1988).

An oral drench of parasiticide has been shown to be an effective application and Ivermectin at 200 mcg/kg, PO or SC, is highly effective against all stages of the larvae.

Frequent change of pastures when bot flies are active may be of some help in reducing infestations, since the flies are short-lived and not capable of long flights. Sudden death may be the only observation in acute infection of Hemonchosis and the lesions are those associated with anemia. In cases in which diarrhea is present, there may be mixed infection with other worm genera(Lloyd and Brewer, 1992). Mature sheep may develop heavy, even fatal, infections, particularly during lactation. Tapeworms are relatively nonpathogenic, but heavy infections can result in mild unthriftiness and GI disturbances. Diagnosis may be made by finding individual segments (which are much wider than long) in the feces or lengths of adult tapeworm protruding from the anus or by demonstrating the characteristic eggs on fecal examination (Sloss *et al.*, 1994).

Sheep are more consistently susceptible to the adverse effects of worms than other livestock, and clinical disease is more common (Meleney *et al.*, 1969). Immunity to the parasites is acquired slowly and is generally incomplete. Frequent treatments may be required, particularly during the first year of life, although a good understanding of local parasite epidemiology will ensure that such treatments are appropriately timed (Meleney *et al.*, 1969).

Acknowledgement:

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a - Brands of Intas Animal Health

b – Brand of Intervet India Pvt. Ltd.

c – Brand of Alembic Animal Health

References:

Kimberling C. V., (1988), Chapter 7 "Diseases of the respiratory system." Jensen and Swift's Diseases of Sheep. 3rd edition, Lea and Febiger, Philadelphia.

Lloyd, J. E., (1985), Chapter 15: "Arthropod Pests of Sheep." Williams R. E. et al. (eds.), Livestock Entomology. Wiley, NewYork.

Lloyd J. E. and Brewer M. J., (1992), Sheep bot fly biology and management. Bulletin Wyoming University, Cooperative Extension Service (USA).

Meleney W. P. and Apodaca S. A., (1969), Regeneration of a population of Oestrusovis in sheep on an isolated range. J American Vet Med Assoc. **155**: 136-138.

Pimentel D., (1981), CRC Handbook of pest management in agriculture, Volume 1. CRC Press, Inc.

Sloss M. W., Kemp R. L. andZajac A. M., (1994), Veterinary clinical parasitology (No. Ed. 6). Iowa State University Press.

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Management of Hypospadias, Atresia ani with scrotal anomaly in a kid (Capra Hircus) - A case report

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Abstract :

This report presents a uncommon case of congenital defect Hypospadias, Atresia ani with scrotal anomaly in a newborn male kid, which showed absence of anal opening and dribbling of urine from pre scrotal area. Both the conditions were corrected surgically and the kid survived without further complications.

Keywords: Congenital, Hypospadias, Atresia ani, Scrotum

Introduction

Congenital abnormalities are mostly reported in field cases atresia ani is very common. Atrasia ani (imperforate anus) is the failure of the anal membranes to break down. It has been reported in all domestic animals. Affected animals may survive for up to 10 days and can be identified by their depression, anorexia, colic, marked abdominal distension and lack of faeces. Faeces being replaced by thick white mucus (Radostitis *et al,* 2000).

Congenital anomalies of the urinary system, such as hypospadias and urethral diverticulum, are reported as sporadic cases in goat kids and lambs (Al-Ani et al, 1998; Dennis and Leipold, 1979; Sharma and Singh, 1995).Hypospadias is a congenital abnormality of anterior urethral and penile development in which the urethral opening is ectopically located on the ventral aspect of the penis proximal to the tip of the glans penis. Hypospadias generally occur as a result of imperfect closure or complete lack of fusion of the urethral grooves during phallus elongation (Kahn et al., 2005; Radostits et al., 2007). Many other congenital anomalies usually co-exist, among which urethral diverticula, urethral stenosis, testicular and penile hypoplasia (Alam et al., 2005), and cryptorchidism are more common (Hayes and Wilson, 1986; Rohatgi et al.,1987). Hypospadias is accompanied by hypoplasia of the corpus cavernosum urethra, causing the urethra to open anywhere along its length at one or more locations. The hypospadias is thus classified on the basis of anatomic localization such as glandular, penile, scrotal, perineal, or anal (Ader and Hobson, 1978; Kahn et al., 2005). This case report describes the clinical findings and surgical correction of hypospadias associated with atrasia ani in a male goat kid.

History and Observation

A two day old male non-descript kid was presented with a history of inability to defecate due to absence of anal opening (resulting in non-passage of muconium) and dribbling of urine from pre scrotal area (not from natural urethtral opening) along with scrotal anomaly. The kid was subjected to detailed clinical examination,

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which revealed marked bulging of anal region upon straining (suggestive of atresia ani) and opening of urethra was observed on the dorsal surface of penis. The kid had not voided urine properly since last 2 days and revealed a tense urinary bladder. The case was tentatively diagnosed as atresia ani, and hypospadias. One remarkable finding was noticed that the kid's scrotal raphae was abnormally prominent, dividing the scrotal sac into two halves, each one with a testicle. Animal was dull and depressed, showed mild tachycardia (140 beats per minute), however, the rectal temperature and respiratory rates were normal.

Treatment

The perineal reconstruction was under taken surgically under local anaesthesia (spinal) as described by Frank (1964). Atresia ani was treated by excision of a circular piece of anal skin. The rectum was exposed after due dissection of the perineal muscles therein. The blind end of the rectum was brought to the level of anal sphincter and fixed to the perineum. This was done by putting four stitches (dorsally, ventrally and laterally on both sides), and blind end flap was removed, contents were evacuated.

For hypospadias, catheter (sterilized semen straw) was passed through the urethal opening from the tip of penis and patency was maintained. Urine started flowing from the natural opening. Opening of the urethra was sutured with simple interrupted suture, and catheter was removed.

Post-operatively, Ceftriaxone @10mg, Meloxicam @ 2ml and nurokind @ 2ml for 5 days, were administered intramuscularly, followed by routine dressing and application of fly repellent ointment voxeto at the operative site to prevent cicatrisation. The suture line was cleaned daily with povidine iodine (cipladine). Sutures were taken off on 8th day post-operatively. Kid recovered without any complications.

Conclusion.

Congenital anomalies such as hypospadias and Atresia ani are frequently observed in field cases and can be treated well surgically.

Reference

Ader, P. L. and H. P. Hobson, (1978), A review of the veterinary literature and a report of three cases in the dog. J Am Anim Hosp Assoc. **14**: 721–727.

Alam, M. R., S. H. Shin, H. B. Lee, I. H. Choi, and Kim N. S, (2005), Hypospadias in three calves: a case report. Vet Med-Czech. **50**: 506–509.

Al-Ani, F. K., W. A. Khamas, K. M. Al-Qudah, and O.Al-Rawashdeh, (1998), Occurrence of congenitalanimalies in Shami breed goats: 211 cases investigated in 19 herds. Small Rumin. Res. **28**:225–232.

Dennis, S. M. and H. W. Leopold, (1979), Ovine congenital defects. Vet Bull. **49**: 233–239.

Frank, E. R., (1964), Veterinary Surgery, 7th edn, Minnapolis, Burgress Publishing Co;pp.279-280.

Hayes, H. M. and G. P. Wilson, (1986), Hospital incidence of hypospadias in dogs in North

Kahn, C. M., S. Line, S. E. Aiello, (2005), Urinary System. The Merck Veterinary Manual, 9th ed. Merck and Co. Inc., Whitehouse Station, N. J.,USA, Pp. 1249–1287.

Radostitis, O. M., Gay, C. C., Blood, D. C., and Hinchcliff, K. W., (2000), Veterinary Medicine: A textbook of the diseases of cattle, sheep, pigs, goats and horses,9thedn, Saunders, Philadelphia, pp.1729.

Radostits, O. M., C. C. Gay, K. W. Hinchcliff, and P. D. Constable, (2007), Veterinary Medicine. 10thEdn., London, Saunders Co., Pp. 573.

Rohatgi, M., P. S. Menon, I. C. Verma, and J. K. Iyengar, (1987), The presence of intersexuality inpatients with advanced hypospadias and undescended gonads. J. Urology. **137**: 263–267.

Sharma, S. N. and Singh J., (1995), The Urinary System. Ruminant Surgery, Eds. Tyagi, R. P. S. and Jit Singh. CBS Publishers, Delhi, India.

The Blue Cross Book, July-Dec 2017, Vol. 36 : 99-100

A rare case of Lymphedema in a dog

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(received 14/09/2016 - accepted 12/01/2017)

Abstract :
Lymphedema in a dog diagnosed on the basis of history, clinical picture, high proteins in lymph fluid, and negative radiological, sonographic and electrocardiographic findings, is reported and discussed.

Key words: Coumarin, Lymphedema, Mastiff, Swelling

Introduction

Lymphedema in dogs is characterized by fluid accumulation in the interstitial space due to abnormal lymphatic drainage. Although, it affects all breeds, Belgian Tervuren, Borzoi, English Bulldog, German Shepherd, German Shorthaired Pointer, Great Dane, Old English Sheepdog, Poodle, Labrador Retrievers and Rottweiler are more predisposed. Reports on lymphedema in dogs are lacking in India. Therefore a case of secondary lymphedema in a female Mastiff dog along with its management is put on record.

History and Investigations

A five year old female Mastiff dog was referred for the diagnosis and treatment of persisting hind limbs swelling for two years that remained refractory to the treatment with prednesolone, meloxicam, doxycycline, serratiopeptidase, protein supplementation, chondratin with glucosamine, furesemide and diethyl carbamazine.

Clinical examination revealed normal temperature (102.2 0 F), normal appetite, bilateral pitting, nonpainful edema of both hind limbs (Fig 1) extending upto thigh (Fig.2), normal

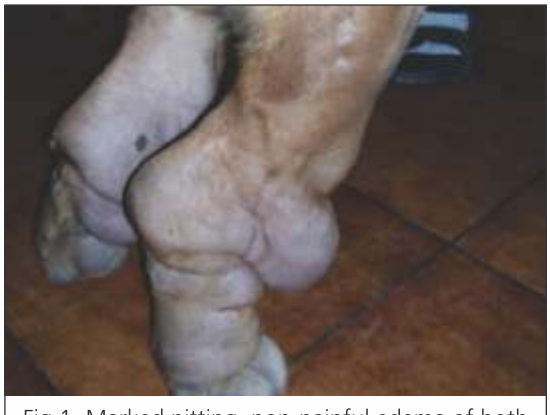

Fig.1. Marked pitting, non-painful edema of both hind limbs in the Mastiff dog.

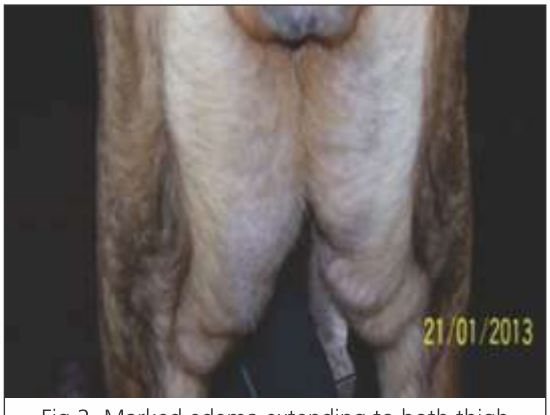

Fig.2. Marked edema extending to both thigh regions in the same Mastiff dog.

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skin but with thickened spongy feel and no lameness. The edema was marked below the tarsi but could be palpated into the inguinal region also. Both sides appeared to be equally affected. The popliteal lymph nodes were not palpable. Clear fluid was oozing from an area distal to the tarsus.

Chest and abdominal X-rays, survey abdominal, pelvic and inguinal region sonography did not reveal any evidence of tumour or any abnormality.Knott test was negative for Dirofilaria. Serum creatinine (1.05 mg/dl), blood urea nitrogen (6.5 mg/dl), SGPT (22.77 IU/L), SGOT(24.12 IU/L), total bilirubin (0.29 mg/dl),total serum proteins (7.88 g/dl), serum potassium (4.56 meq/l),serum sodium (146.7 meq/l), serum chloride 112 meq/l), haemoglobin (12.8gm/dl) were within the normal range. Electrocardiogram was also within normal limits. However, protein concentration in lymphatic fluid was high (2.8 g/dl).

Diagnosis and Treatment

Diagnosis was based largely on the history and clinical picture of pitting odema, negative x-ray , ultrasonographic, electrocartdiographic and Knott test findings.

Treatment was adopted with pressure wraps, warm water massage and oral coumarin @ 5 mg PO once daily for 6 months. Topical skin care and intermittent antibiotic therapy with Ceftrioxone (15 mg/kg IM) was also followed.

Discussion

Persistent lymphedema occurs only after destruction or blockage of a considerable number of major lymph channels or several sequential lymph nodes with their afferent or efferent lymphatics (Witte and Witte, 1995). Secondary lymphedema are often related to a combination of lymphatic and venous obstruction. Though various causes has been incriminated for secondary lymphedema, no definite cause could be ascertained in the present case. It appears that bilateral hind limb odema extending up to thigh could be due to sublumbar or intrapelvic obstruction (Ettinger and Feldman,2000). Diagnosis in this case was largely based on history and clinical picture. For confirmatory diagnosis in such uncertain cases, lymphography and lymphoscintigraphy are an additional approaches (Ettinger and Feldman, 2000). There is no curative treatment for lymphedema. Pressure wraps, warm water massage are advised with oral administration of coumarin. Compression bandages are regularly changed to prevent the affected area from being infected. Topical skin care and intermittent antibiotics aimed at reducing cellulitis. Since odematous fluid contained high proteins (2.8 g/dl), coumarin was adopted as has been advocated in humans to reduce high protein edema by stimulating macrophages, promoting proteolysis and enhancing absorption of protein fragments (Casley-Smith and Casley-Smith, 1988). Frequent gentle massaging of the area also helped in reducing swelling and improving fluid circulation. With the treatment adopted swelling reduced and the dog was comfortable.

Acknowledgements:

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References

Casley-Smith J. R and Casley-Smith J. R., (1988), The pathophysiology of lymphedema and the action of benzo-pyrones in reducing it. Lymphology **21**:190-194. 62.

Ettinger, S. J. and Feldman, E .C., (2000), Textbook of Veterinary Internal Medicine. Diseases of the Dog and Cat. 5th edn, Vol.1 W. B. Saunders Company, Philadelphia pp977-981.

Witte, C. L. and Witte, M. H., (1995), Disorders of Lymph flow. In: Academic Radiology. **2**:324-334.

The Blue Cross Book, July-Dec 2017, Vol. 36 : 101-106

Efficacy of Post-surgery Intralesional Bleomycin Chemotherapy in Canine Acanthomatous Ameloblastoma in a Male Labrador Retriever

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Abstract :

Clinical examination of the oral cavity of a dog patient, Beau revealed, protruding from the upper left hard palate, a firm mass rostral to the left canine tooth. The multi-lobed pale pink growth was of smooth texture. Case records showed that the patient was brought earlier for treatment of an identical oral cancer, which was surgically excised in August, 2015. But during the subsequent four month's period, the growth reappeared gradually in the original site. The clinical profile was highly suggestive of canine acanthomatous ameloblastoma (CAA).With curative intent, sequential bimonthly post-surgery intralesional chemotherapy with the proven anticancer antibiotic, bleomycin was scheduled with the expectation of developing a new line of effective combination treatment for preventing recurrence of the obstinate oral tumor. Favourable response was evidenced by restoration of the patient's normal health status and improved behavioural profile concurrent with rapid decrease in the surgical wound size. Physical examination at the follow-up visits revealed no clinical evidence of CAA recurrence. The wound healed uneventfully in four weeks time. However, the *in situ* bleomycin protocol was continued up to 12 weeks for enhanced bio-safety. No major adverse side effects were encountered, and the pulmonary function remained uncompromised during the specified extended treatment period.

Key words: Canine acanthomatous ameloblastoma, Local infiltration, Surgery, Bleomycin, Chemotherapy

Introduction

Canine acanthomatous ameloblastoma (CAA), known as Acanthomatous epulis earlier, is a locally progressive benign gingival tumor of dogs, usually located in the rostral mandible in the oral cavity (Baker *et al.,* 1993; Liptak and Withrow, 2007). Often invading the jaw bone, it does not metastasize to the lungs, or internal organs. In medical parlance, 'ameloblastoma' relates to the highly specialized enamel synthesizing odontogenic progenitor epithelial cells, and 'acanthomatous' to the characteristic spiny geometry of these transformed neoplastic cells (Yoshida *et al.,* 1998).

The CAAs usually comprise islands and cords of proliferating odontogenic cells in the gingival mucosa, bordered by a single row of characteristic ameloblastic cells. However, marked nuances in the histopathological features (Das *et al*., 2013) may pose difficulty in diagnosis. Further, the propensity for local invasion may contribute significantly to recurrence following surgical excision (Bobstock and White, 1987).

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A retrospective study of Veterinary Medical Teaching Hospital archives at the University of California, Davis (Woodward, 2011) revealed that Golden Retriever, Akitas, and Cocker Spaniel are among the most predisposed breeds. In view of the marked tendency of local invasion into the surrounding bone, veterinary oncology specialists' clinical experience mandates excision of the mass with safe 0.5-1cm margins inside the adjoining normal tissue. Thus, a small portion of the jawbone may also be carefully chiseled along with the tumor to minimize the chances of tumor recurrence. Advanced imaging: dental radiography, CT scan, or MRI are very useful in determining the tumor 3-D configuration and evaluating with confidence the pros and cons of surgical excision. Clean surgical margins equate to excellent prognosis with <5% chances of recurrence (Withrow and Holmberg, 1983; White and Gorman, 1989). Non-resectable large tumors may be managed with radiation / chemotherapy. Response to surgery-cum-intralesional bleomycin chemotherapy is presented in this communication.

Case history

Beau, a client-owned seven year old neutered Labrador Retriever (40 kg body weight) was brought to the Angel Animal Hospital, Farmington Hills, MI, USA in mid-December, 2015 with a history of excessive salivation, foul smelling breath, in-appetence and perceptible asymmetry of the mandible. Examination the oral cavity revealed a firm mass (3.3 cm x 2.7 cm) protruding from the upper left hard palate, rostral to the left upper canine tooth (Fig. 1).

The pale pink growth, attached to the gum with a stalk was multiple lobed and of smooth texture. Records showed that patient was brought to the clinic by the owner earlier with an identical growth in the same anatomical location in the oral cavity, which was surgically excised as per the standard procedure on August 18, 2015. But

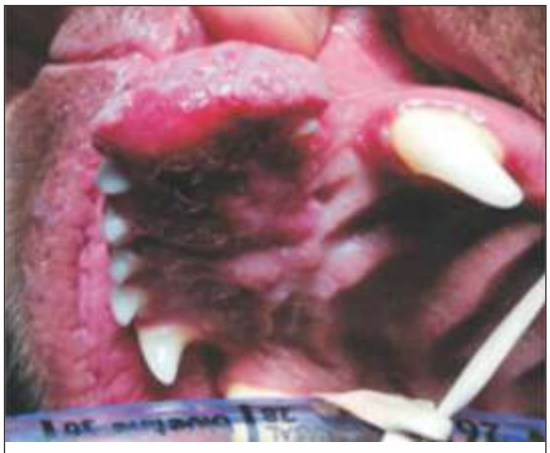

Fig 1: Oral mass in maxilla

the growth reappeared during the following four months. The case history was highly suggestive of CAA. In order to prevent tumor recurrence in future, combination treatment: proven sequential intralesional chemotherpay with bleomycin (Kelly *et al.,* 2010) following total surgical excision was considered the best option.

Diagnosis and Treatment

Preparation - Pre-surgery health status of the patient was evaluated with the routine clinical examination, blood biochemical analysis, and skull and thoracic plain radiography, using the

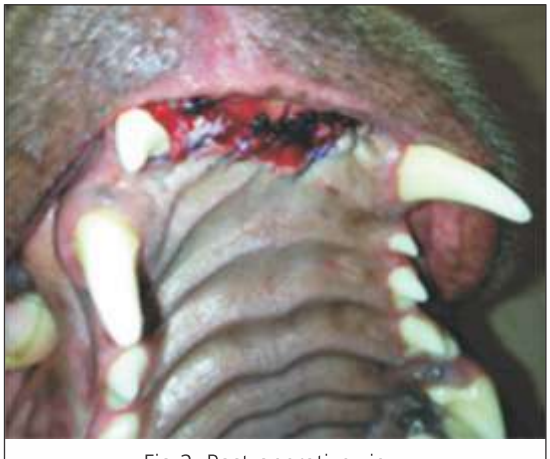

Fig 2: Post-operative view

advanced in-house diagnostics facilities.

The blood biochemical indices attested to the structural/ functional patency of the liver, kidney, heart muscles and bones.

Serological tests - Antigen detection tests for heart worm, *Ehrlichia canis / evensii, Borrelia burgdorferi and Anaplasma spp.* proved -ve.

Surgical treatment - The suitably prepared patient (fasted overnight in the owner's premises) was admitted to the clinic early in the morning of December 29, 2015. Pre-anaesthetic agent atropine was administered subcut. Anaesthesia was induced with propofol, and maintained with isoflurane gas. The surgery site was gently scrubbed with chlorhexidine antiseptic soap, followed with chlorhexidine tincture. The patient was given i.v. infusion of Normosol® (sterilized 0.09% saline sol.), and a single dose of dexamethasone (0.2 mg/kg) to suppress the pain perception and tissue reaction (Thrall, 1984). The patient's clinical condition was continuously monitored in the OT with Pulse Oximeter and ApAlert. The almond sized firm mass, rostral to the left upper canine tooth along with one cm of healthy tissue all round was removed carefully with clean surgical excision

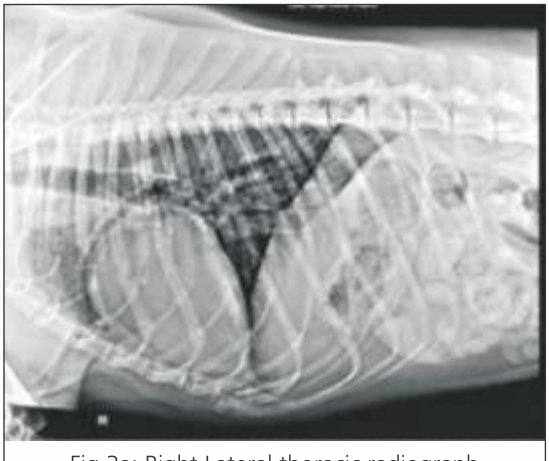

Fig 3a: Right Lateral thoracic radiograph

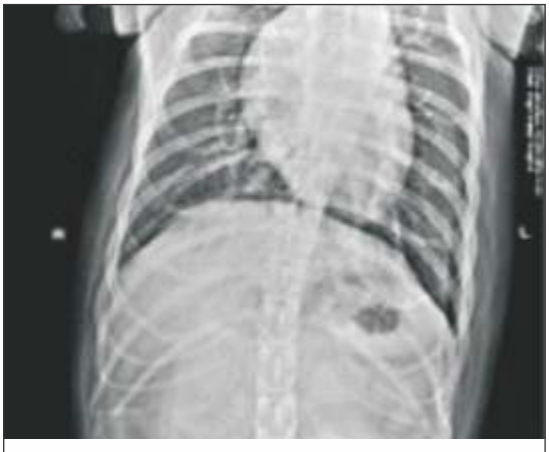

Fig 3b: Ventro-Dorsal vies

(Fig. 2). In-house thoracic radiography ruled out metastasis to the lungs, or the other adjoining tissues (Fig. 3a & 3b).

Histopathology - Excised tissue biopsies were fixed in 10% neutral buffer formaldehyde solution, coded and dispatched to the IDEXX Laboratories (USA) for detailed histo-pathological investigation. Paraffin embedded tissue sections (5µ) were stained with H & E stain and examined under low (40x) and high (400x) magnification. Microscopic profile of the tumor biopsy revealed - extending from and contiguous with the overlying epithelium - broad trabeculated strings of neoplastic dental epithelium, penetrating deep into the sub-mucosa. Surrounding proliferation of the dental mesenchyma with multifocal areas of ossification was also clearly visible (Fig. 4a & 4b). The polygonal neoplastic epithelial cells exhibited moderate amount of eosinophilic cytoplasm, discrete cell boundaries, and prominent intra-cytoplasmic bridges. The round shaped nuclei contained finely stippled chromatin with prominent nucleoli (1-2). Anisocyosis and anisokaryosis of mild intensity were also observed. The mitotic index was 2 per 10 HPFs (400x). Hyperplasia of the adjacent epithelium with multifocal infiltration of moderate intensity

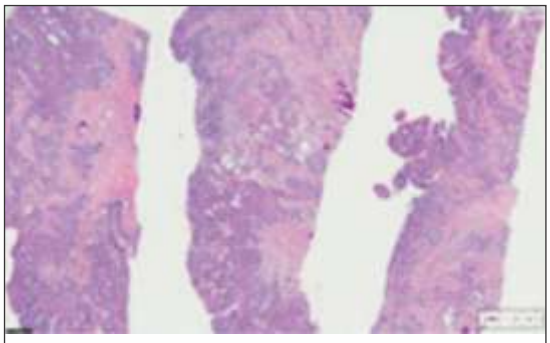

Fig. 4a. Histopathology at 10X

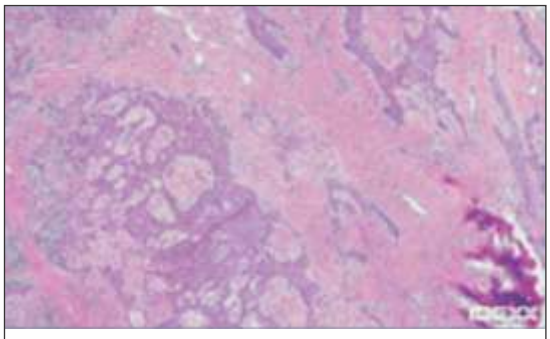

Fig. 4b. Histopathology at 40X

by evaginated lymphocytes was also discernible. Neoplastic cell transformation extended right up to the margins (Fig.5a & 5b). The Pathologist's microscopic interpretation was Acanthomatous ameloblastosis of the oral cavity.

***In situ* chemotherapy -** The full contents of a single dose vial bleomycin sulfate for injection USP 15 U (Teva) were reconstituted with 1.0 ml sterile iso osmotic saline solution (0.09%). Of the series of six scheduled injections at 2-week regular intervals, the first was administered to the patient 4 weeks post-surgery on 29th January, 2016. The anti-neoplastic drug was dispensed with a needle stick, distributed at 8-10 different points into the progressively healing surgical wound, and also into the peritumoral area with gentle massage to facilitate tissue infusion, where the anatomy permitted. Pressure on the syringe plunger was carefully adjusted to avoid backflow or leakage. Proper post-surgery care was taken by the client at home under advisory, and follow-up inspection was conducted in the clinic for early detection of tumor recurrence, every alternate week, continuously for 12 weeks.

Response evaluation - Favourable response to the combination line of treatment (surgery-cum-*in situ* bleomycin chemotherapy) was evidenced by progressive decrease in the surgical wound size with improved general health condition and behavioural profile of the patient. The wound healed completely by second intention in four weeks time. However, the bleomycin injection schedule was continued up to 12 weeks for enhanced margin of safety. No serious adverse side effects were noticed, and the pulmonary

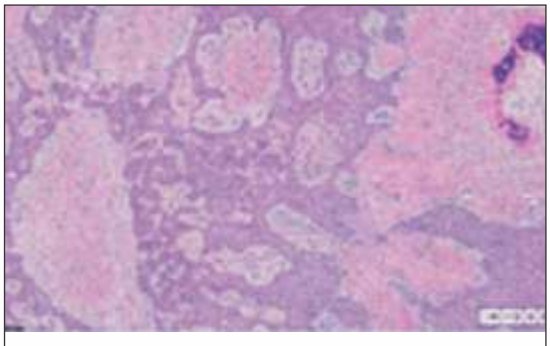

Fig. 5a. Histopathology at 100X

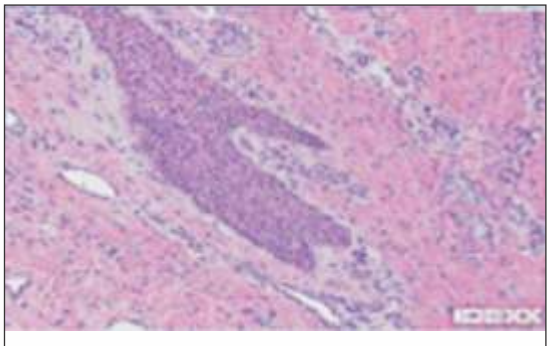

Fig. 5b. Histopathology at 1000X

function remained unimpaired with no evidence of fibrosis. The CAA lesion did not recur in the 90-day observation period.

Discussion

It is enigmatic that technically a benign tumor, being locally aggressive CAA is often prone to invade the alveolar bone with deleterious bio-impact. The marked propensity to recur after marginal surgery is established by the documented evidences (Yoshida *et al.*, 1998; Liptak and Withrow, 2007). Currently, the remedial measures include surgical excision and radiation therapy. Whereas marginal excision without partial resection of the invaded adjacent jaw bone area (on cosmetic considerations) is associated with the risk of early local recurrence, surgical intervention with partial bone removal has a recurrence rate of <5% (Withrow and Holmberg, 1983; White and Gorman, 1989). Full course 48 Gy radiation therapy resulted in a survival rate of 80% with life span of 3 years post-treatment, but local recurrence occurred in 8-18% of the CAA dog patients (Thrall, 1984; Theon *et al.,* 1996).

Bleomycin, a mixture of cytotoxic glycopeptide antibiotic produced by a strain of *Streoptomyces verticillus* is also a highly potent anticancer drug in animals and humans (Yoshida *et al.,* 1998; Fuchihata *et al.,* 1984; Plumb, 2005; Boeheim *et al.,* 1986) and figures in the World Health Organization List of Essential Medicines. A pertinent retrospective study (Kelly *et al.,* 2010) documented the favourable response to fractionated bleomycin injected directly into the intact CAA mass at multiple sites, without recourse to surgical excision. In this communication, we report on the efficacy of bleomycin, injected into the healing surgical wound for improved curative response.

Future perspectives

Chemotherapy *in situ* has the distinct pharmaco-kinetic advantage of assured high local drug concentration with the minimum systemic toxicity (Orenberg *et al.,* 1992).However, long-term controlled trials with or without concurrent fractionated radiation therapy on a statistically significant number of clinical cases of CAA are recommended by us to firmly establish the efficacy of the novel combination treatment.

References

Baker, I. K., Van Druemel, A. A. and Palmer, N., (1993), The Alimentery system In. Pathology of Domestic Animals, 4th edn., Jubb, K.V.F., Kennedy, O. C. and Palmer, N. eds., Academic Press, San Diego, California, US, pp. 17-25.

Boeheim, K., Teicher, B., Erwin, T. J. and Shklar, G., (1986), The effect of chemotherapeutic agent on human oral squamous cell carcinoma transplanted to nude mice: A histopathological study. *Oral Surg. Oral Med. Oral Path.,* **63**:50-56.

Bostock, D. E. and White, R. A.(1987). Classification and behavior after surgery of canine epulides. *J. Comp. Path.***97**: 197-206.

Das, Shubhagata, Nath, B. K., Alim, Md. A., Sikdar, S. and Pallab, M. S., (2013), Acanthomatous ameloblastoma in a female Spitz dog with rare atypical histomorphology: A case study. Doi:10.5455/vet world. 219-222.

Fuchihata, H., Fukukawa, S., Murakami, S., Kubo, K., Shimizutani, K., Ikeda, H., Inoue, T. and Masaki, N., (1984), The results of combined external irradiation and chemotherapy of bleomycin or peplomycin for squamous cell carcinoma of the lower gingiva. *Internat. J. Radia. Oncol. Biol. Phys.,* **29**: 703-709.

Kelly, Jeannette M., Belding, B. A. and Schaefer, A. K., (2010), Acanthomatous ameloblastoma in dogs treated with intralesional bleomycin. *Vet. Com. Oncol.,* **8**: 81-86.

Liptak, J. M. and Withrow, S. J., (2007), Cancer of the gastrointestinal tract. *In*: Withrow, S. J. and Vail, D. M., eds. *Withrow and MacEwen's Small Animal Clinical Oncology,* 4th edn. Elsevier Science, St. Louis, Missouri, US, pp. 457-475.

Orenberg, E. K., Luck, E. E., Brown, D. M. and Kitchell, B. E., (1992), Implant delivery system: Intralesional delivery of chemotherapeutic agents for treatment of spontaneous skin tumors in the veterinary patients. *Clinics Dermatol.,* **9 :** 561-568.

Plumb, D. C., (2005), Blueomycin sulfate. *In: Plumb's Veterinary Drug Handbook,* 5th edn. Stockholm, Sweden: Blackwell Publishing Professional, pp. 91-93.

Theon, A. P., Van Vechten, M. K. and Madewell, B. R. (1996). Intra-tumoral administration of carboplatin for treatment of squamous cell carcinomas of the nasal plane in felines. *Am. J. Vet. Res.,* **57**: 201-210.

Thrall, D. E., (1984), Orthovoltage radiography of acanthomatous epulides in 39 dogs. *J. Am. Vet. Med. Assoc.,* **184**: 826-829.

White, R.A.S. and Gorman, N. T., (1989), Wide local excision of acanthomatous epulides in the dog. *Vet. Surg.,* **18**: 12-14.

Withrow, S. J. and Holmberg, D. L., (1983), Mandibulectomy in the treatment of oral cancer. *J. Am. Anim. Hosp. Assoc.,* **19**: 273-286.

Woodward, T., (2011), Update on CAA (aka-Acanthomatous Epulis), 2011. Available at: http://www.wellpets.com/vet-dentistry-benign-oral-tumor/

Yoshida, K., Watarai, Y., Sakai, Y., Yanai, T., Masegi, T., Iwasaki, T., (1998), The effect of intralesional bleomycin on canine acanthomatous epulis. J. *Am. Anim. Hosp. Assoc.,* **34**: 457-461.

Metabolic and Mineral deficiency diseases of animals

Manganese deficiency

Deficiency of manganese causes skeletal abnormalities, knuckling of fetlocks, enlarged joints, joint pain, weak oestrous and infertility.

Treatment:

Supplementation of manganese sulphate @ 4 gram per day in the diet.

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Case study of Demodicosis in a Tibetan Mastiff

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Abstract:

In the present study, Infestation with demodectic mites, Demodex canis was diagnosed in an 8-month-old male Tibetan Mastiff dog and after 1 month of amitraz dip treatments, Doramectin treatment and Cefpodoxime use skin scrapings were negative and hair regrowth appeared.

Key words: Demodex, Tibetan Mastiff, Doramectin

Introduction:

Demodicosis is a common skin disease of the dog. Despite a number of studies evaluating pathogenesis and therapeutic options, treatment of canine demodicosis is still a matter of discussion in many conferences and continuing education courses (Mueller *et al.*, 2012). In October 2010, an international committee was founded to establish current evidence-based guidelines for treating canine demodicosis in practice.

Demodex canis is a normal resident of the intact canine skin, being present in small numbers in virtually every dog (Miller *et al.*, 2013). Receptivity of dogs to demodicosis and progression of the clinical disease are influenced by numerous factors including; genetic defect, alteration of skin structure and biochemistry, immunological disorders, hormonal status, breed, age, nutritional status, oxidative stress, length of hair coat, stage of oestrus cycle, parturition, endoparasitism and debilitating diseases. Of these, the immune status is thought to be the most significant (Toman *et al.*, 1997). Generalized demodicosis requires a cutaneous environment that is ecologically and immunologically favorable for extreme colonization of demodectic mites.

Clinical signs and Diagnosis:

An 8 month old male Tibetan Mastiff dog was presented to the SIAH, Tanuku with Skin lesions on the face and the forelegs in form of alopecia, erythema, ulcers and crusts. Secondary bacterial skin infection was evident in the form of pustules. Pedal lesions with significant interdigital oedema were distressingly painful.

Deep skin scrapings:

Multiple scrapings (approximately 1 cm^2) of affected skin were performed in the direction of the hair growth, at primary lesions, such as follicular papules and pustules. The skin was scraped until capillary bleeding occurred. Debris was then transferred to a slide, mixed with liquid paraffin oil and examined with a cover slip under the microscope at low-power magnification (×4 and ×10 lens). Microscopic examination revealed Demodex canis mites. Pedal Demodicosis was evident from inter digital lesions.

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Fig 1: On the 1st day of presentation, the Demodectic lesions are scaly and erythematous with papules, pustules, crusts.

Fig. 2: The Tibetan mastiff dog after 20th day of treatment showing reduction in lesions and appearance of hair growth.

Therapeutic Management and results:

Clip of the hair coat was advised. The Taktic® (Amitraz) rinse @ 0.025% was applied carefully with a sponge and soaking the skin and allowed to air dry without rinsing. The dog wasn't allowed to get wet between rinses, to avoid washing off the amitraz.

1% Dectomaxb (Doramectin) was administered @ 200 mcg/kg SC daily for 3 weeks. For secondary bacterial infections, Cefpetc @ 10mg tab SID eas advised for 21 days. Topical therapy with Petbend (Benzoyl peroxide) shampoo advised weekly twice. Different life stages of Demodex canis (eggs, larvae, nymphs and adults) were recorded, compared from the same sites at each weekly visit and evaluated response to the treatment. The skin samples were negative after 21 days of the treatment.

Discussion:

Demodicosis can usually be diagnosed by deep skin scrapings or trichograms, but in rare cases a skin biopsy may be needed for diagnosis. For deep skin scrapings, squeezing the skin has been shown to increase the number of mites found with the skin scrapings (Fondati *et al.*, 2010). Although Demodex mites are part of the normal microfauna, it is uncommon to find one mite even on several deep skin scrapings. If a mite is found, this should raise suspicion and additional skin scrapings should be performed. Finding more than one mite is strongly suggestive of clinical demodicosis (Robson *et al.*, 2003). Most commonly, *Staphylococcus pseudintermedius* will be present in bacterial infections associated with Demodicosis, but in some dogs, particularly those with furunculosis, Gram-negative rods, such as Escherichia coli or Pseudomonas aeruginosa, may predominate (Kwochka *et al.*, 1991). Secondary bacterial skin infections frequently complicate the disease and require topical and/or systemic antimicrobial therapy (Kwochka *et al.*, 1991).

There is good evidence for the efficacy of weekly amitraz rinses (recommended concentration varies from 0.025 to 0.06%,) and daily oral macrocyclic lactones such as milbemycin oxime, ivermectin, Doramectin and moxidectin for the treatment of canine demodicosis (Mueller *et al.*, 2012). In the present case, Doramectin was used.

Systemic macrocyclic lactones may cause neurological adverse effects in sensitive dogs, thus a gradual increase to the final therapeutic dose may be prudent (particularly in herding breeds). Treatment should be monitored with weekly skin scrapings and multiple negative skin scrapings can be relied upon as the end-point of treatment (Mueller *et al.*, 2012).

Acknowledgement:

The authors are thankful to the Director of Animal Husbandry, Andhra Pradesh for providing the necessary facilities to carry out the work.

References:

Fondati A., De Lucia M., Furiani N., Monaco M., Ordeix L., & Scarampella F., (2010). Prevalence of Demodex canis-positive healthy dogs at trichoscopic examination. *Veterinary dermatology*, **21**(2), 146-151.

Kwochka K. W., & Kowalski J. J., (1991), Prophylactic efficacy of four antibacterial shampoos against Staphylococcus intermedius in dogs. *American journal of veterinary research*, **52**(1), 115-118.

Miller W. H., Griffin C. E., Campbell K. L., & Muller G. H., (2013), Muller and Kirk's Small Animal Dermatology7: *Muller and Kirk's Small Animal Dermatology*. Elsevier Health Sciences.

Mueller R. S., Bensignor E., Ferrer L., Holm B., Lemarie, S., Paradis M., & Shipstone M. A., (2012). Treatment of demodicosis in dogs: 2011 clinical practice guidelines, Veterinary dermatology, **23**(2), 86-e21.

Robson D. C., Burton G. G., Bassett R., Shipstone M., & Mueller, R. (2003). Eight cases of demodicosis caused by a long-bodied Demodex species (1997-2002). *Australian Veterinary Practitioner*, **33**(2), 64-+.

Toman M., Svoboda M., Rybnicek J., Krejci J., Faldyna M., & Barta O., (1997), Immunosuppression in dogs with pyoderma and/or demodicosis. *Veterinarni medicina*, **42**(10), 299-306.

Metabolic and Mineral deficiency diseases of animals

Zinc deficiency

Zinc deficiency is characterized by parakeratosis, alopecia, wool eating, abnormal hoof growth, lameness, stunted growth, abnormalities of bone, stiffness of joints, delayed sexual maturity and matting of hair.

Treatment:

In swine parakeratosis add 200 mg of zinc sulphate or zinc carbonate per kg of feed.

The Blue Cross Book, July-Dec 2017, Vol. 36 : 110-112

Case report of Tick Paralysis in canine species

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(received 09/03/2017 - accepted 11/06/2017)

Abstract

A case report of Tick paralysis in a dog is presented and discussed.

Key words: Tick Paralysis, Dogs

Introduction

Tick paralysis (toxicity) is an acute, progressive, symmetrical, ascending motor paralysis caused by salivary neurotoxin(s) produced by certain species of ticks (Atwell, 2010a). The maximal prevalence of tick paralysis is associated with seasonal activity of female ticks, mainly in spring and early summer, but in some areas ticks are active throughout the year. This toxicity is unique, because it is a pulsed toxin flow associated with repeat tick feeding over a set period of time. Animals are generally affected by paralysis, but there are also very odd presentations of associated toxicity (Shaw, 2000). With some species, other signs of systemic "single organ" toxicity (eg, cardiac, airway, bladder, lung, esophagus, etc) may be seen separate to or within the classic paretic-paralysis presentation. Toxicity does not relate directly to tick size, number or duration of attachment (Atwell, 2010a). Deterioration can be unpredictable and rapid in some cases but some animals may have prolonged and unexplainable recovery. Very severe cases require intensive care, including artificial ventilation, to maximize recovery rates and generally, only tick removal with use of tick antitoxin serum (TAS) and antibiotics have a major effect on overall mortality (Atwell, 2010b).

Clinical Presentation

In the present case study, a 6 year old vaccinated spitz cross pet was presented to the SIAH (State institute of Animal Health), Tanuku in a recumbent state with severe tick infestation especially over dorsal abdominal region with history of acute onset of paralysis (Fig. 1). Tick species found over the animal were *Ixodes* and *Amblyoma sps.* Clinical signs included Dysphonia or loss of voice (laryngeal paresis), hindlimb in coordination and weakness, change in breathing rhythm, rate, depth and effort, vomiting, forelegs extended with marked expiratory

Fig 1. Severe tick population seen in dorsal abdomen of the pet

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stridor. Blood picture revealed 7.6% hemoglobin. Botulism, canine distemper and snake bite were ruled out on differential diagnosis.

Treatment

Ticks present on the animal were totally removed manually and Atropine @ 0.02 mg/kg body weight (repeated every 6 hr) administered to reduce excessive GI and respiratory secretions. Broad spectrum antibiotic, Intacef[a] (Ceftriaxone) (@ 10 mg/kg b.wt BID), Metoclopramide[b] 0.5-1mg/kg IV to control vomitings and IV Hemaccel[c] along with diuretic, Ridema[d] (furosemide) (@ 5 mg/kg b.wt BID) was administered to the dog for first 48 hours. The animal was placed on its sternum to maximize lung function. Temperature and urinary function was monitored twice daily. Bladder was expressed when there's no urinary output. After 48 hours, dog show signs of improvement in terms of respiration, movement and was able to bark after 72 hours.

Case Discussion

In most infestations (except *Ixodes holocyclus*), removal of all ticks usually results in improvement within 24 hr and complete recovery within 72 hr. If ticks are not removed, death may occur by respiratory paralysis in 1–5 days (Atwell, 2011). In Tick Paralysis cases, most dogs become ill on day 4 of tick attachment. Paralysis usually occurs during the period of rapid engorgement by the adult female Ixodes, but there are reports caused by large numbers of larval or nymphal ticks. It is presumed that the toxin travels from the attachment site to the systemic circulation via lymph system (Atwell et al., 2000). The main cause of death in severe cases is primary hypoventilation. The toxin also causes myocardial depression and diastolic failure, which leads to cardiogenic pulmonary oedema and signs of congestive heart failure

Fig 2. The pet was placed on its sternum to maximize lung function

(Atwell et al., 2000). In Severe cases, increased PCV with normal serum protein leads to a fluid shift into lungs and more guarded prognosis. Usual treatment includes Tick Antiserum (TAS) administration to neutralize the toxin @ minimum dose of 0.5-1.0ml/kg slow deliver by IV or IP (Atwell, 2010b). Due to non-availability, TAS wasn't used in the present study. Fluid therapy should be used with great care, because pulmonary edema can be induced easily. In small patients, SC or IP fluids can be given, if lung status is a concern. The dog's ability to bark, is the last toxicity sign to recover, so when it can bark, all other systems are back to normal (Atwell, 2011).

Owners should not rely solely on chemical control to prevent tick infestation, because no product is totally effective and a single attached tick can cause the disease. Combination therapy (eg, spray, Spot-ons, tablets and collar) may give better results by using multi modes of action (Atwell, 2011). Owners should be encouraged to thoroughly search the pet coat daily and keep the coat as short as possible (to aid searching).

Acknowledgement

The authors are thankful to the Director of

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a - Brand of Intas Animal Health, Ahmedabad

b - Brand of IPCA laboratories, Ahmedabad

c- Brand of Abbott Healthcare Pvt. Ltd. Hyderabad

d - Brand of Vetoquinol India Animal Health Pvt. Ltd., Mumbai

References

Atwell, R.B., Campbell, F.E. and Court, E., (2000), The Attachment Sites of the Paralysis Tick (Ixodes holocyclus) on dogs, *Aust Vet Practit,* **30**(2).

Atwell, R., (2010b), Tick Anti (Toxin) Serum – An overview of Knowns and Unknowns. A Technical Bulletin for veterinarians. Merial, Bulletin 3:May 2010

Atwell, R., (2010a), Tick Paralysis in The Merck Veterinary Manual, Merck & Co. *INC., Whitehouse Station, NJ, USA,* 1204-1210.

Atwell, R., (2011), Treatment of Tick Paralysis and Heartworm- Continuing Education Series, seminar sponsored by Merial, Shellharbour, July 2011

Shaw, M., (2000)., The Australian Paralysis Tick in Newsletter of the Friends of the Far North Flying Foxes Inc., Edition 5.

Metabolic and Mineral deficiency diseases of animals

Copper deficiency

It is characterized by general unthriftiness, loss of milk production, anemia, rough body coat and poor growth.

Treatment:

1) Give 4 grams of copper sulphate orally to calves of 2 to 6 months of age weekly for 3 to 5 weeks.
2) To adult cattle give 8 to 10 grams of copper sulphate orally weekly for 3 to 5 weeks. 3) Add copper sulphate to mineral mixture @ 3-5 %. of total mineral mixture.

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Sarcoptic mange treatment with Ivermectin in rabbits

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Abstract :
Two rabbits having dermatological problem were clinically investigated and high density of adult *Sarcoptes scabiei* along with eggs were identified. Treatment of Ivermectin was found successful and complete recovery was recorded.

Key words : Ivermectin, mange, rabbit, scabies.

Introduction

Dermatological problems are one of the most common clinical entities in domestic pets and fur bearing animals (Deshmuk *et al.,* 2010) due to hot and humid climate (Aulakh *et al.,* 2003). The mite is easily transmitted to rabbit by direct skin contact between infected and non infected rabbit, through close contact with environment (Panigrahi and Gupta 2013). It causes infestation which affects ears, nose, feet, eyes, muzzle and neck region (Kachhawa *et al.,* 2013). If Sarcoptic mange left untreated, then it may cause significant morbidity and economic losses in livestock.

History and Clinical findings

Two rabbits were presented at TVCC, College of Veterinary Science and Animal Husbandry, Kumarganj, Faizabad during months of October and November, 2016 when unseasonal rainfall during winter caused sudden changes in environmental temperatures. Both rabbits had history of itching ear, nose, feet, eyes, muzzle and neck region. Clinical examination revealed crustaceous lesions on head, ear pinna and legs. Both rabbits, aged about 9-10 months were affected with clinical signs of anorexia, anaemia, intense itching, erythema, petiriasis, white indurated dry crust like lesions on ears, nose, face, around ear and paws (Fig.1 and 2). The condition of infested rabbits was weak and body coat was ruffled. The history revealed that rabbits were kept in moist, dirty and poor ventilated house.

Laboratory examination and diagnosis

Skin scrapping of affected parts and its microscopic examination was performed as described by Soulsby (1985). Skin scrapings from each rabbit were taken from four different sites viz. ear, feet, nose, eyes, muzzle and neck region. Each sample was dissolved in 5ml of a 10% solution of potassium hydroxide (KOH). The parasitological and clinical examination revealed that these rabbits were infested with *Sarcoptes scabiei (Fig. 3).*

Therapeutic Management

After confirmation by laboratory investigation of Scabies, affected rabbits were treated with Neomec (ivermectin) tablet 1/10 given orally in drinking water OD for 7 days on two occasions

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Fig. 1 : Crust formation on eye, mouth and ears

along with supportive treatment liquid A to Z (multivitamin) given 3-4 drops orally OD, Lotion Spectrazole (econazole nitrate) applied locally twice daily. Uneventful recovery was noticed after 7 days of treatment and no mites observed in skin scrapping. The same treatment was continued for 15 days more. Clinically, significant improvement was noted on 7th day and rabbits recovered completely after 21st days.

Results and Discussion

In highly infested rabbits ears, eyes, nose, feet had crusts and were red prior to treatment. Clinical findings of sarcoptic mange include

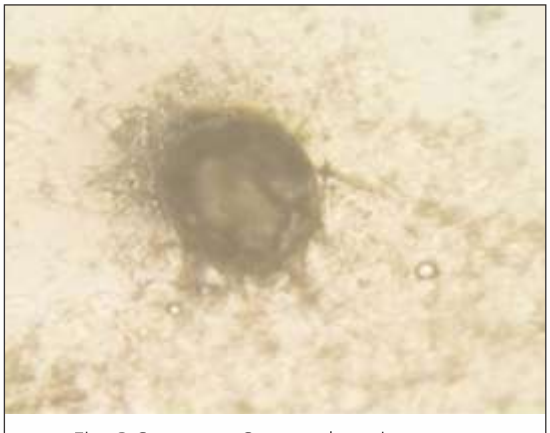

Fig. 3 Sarcoptes Spp. under microscope

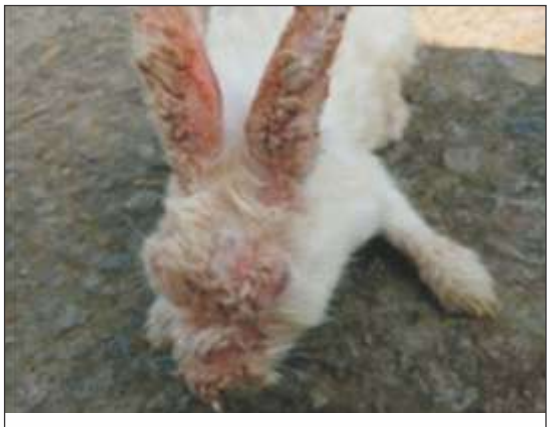

Fig. 2 : Crust formation on eye, mouth and ears

intense pruritus, seborrhea, brownish discharge and loss of hair in acute cases due to a hypersensitivity reaction, crusting and hyperkeratosis in chronic cases (Davies, 1991). *Sarcoptes scabiei* are highly contagious and burrows deep in epidermis of skin rabbits (Wall and Shearer, 1997). The rabbits showed pruritus and were intermittently scratching area with front paws. After sometime, hemorrhagic crusts with fissures developed, even becoming deteriorate in places (Darzi *et al.,* 2007). Ivermectin, at a dosage of 0.2-0.4 mg/kg of body weight administered subcutaneously once every 2 weeks for 2-3 treatments is usually a simple, safe, effective treatment (White *et al.,* 2003; Galdhar *et al.,* 2015). Present observations indicates ivermectin therapy coupled with proper housing management, proper ventilation, disinfection of rabbit cages and segregation of infected animals from healthy animal is effective in control of scabies in rabbits.

Acknowledgement

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References

Aulakh, G. S., Singh, S., Singla, L. D. and Singla, N., (2003), Pathology and therapy of natural notoedric acariosis in rabbits. *J. Vet. Parasitol.,* **17**:127-29.

Bornstein, S.M.T. and Samuel, WM, (2001), Parasitic diseases of wild mammals. In W. M. Samuel, M. J. Pybus, and A. A. Kocan (ed.), Iowa State University Press, Ames, Iowa. pp. 107-119.

Chandey, J., Nambi, A. P., Jeyaraja, K. and Gowri, B., (2000), Clinicopathological and biochemical studies in scabies in dogs. *Indian Vet. J.,* **77**: 755-57.

Darzi, M.M., Mir, M. S., Shahardar, R. A. and Pandit, B. A., (2007), Clinicopathological, histochemical andtherapeutic studies on concurrent sarcoptic andnotoedric acariosis in rabbits (Oryctolagus cuniculus). *Vet. Arhiv.,* **77**: 167-75.

Davies, P. R., Moore, M. J. and Pointon, A. M., (1991), Sarcoptic mite hypersensitivity and skin lesions inslaughtered pigs. *Vet. Rec.,* **128**:516-18.

Deshmukh, V. V., Varshney, J. P., Chaudhary, P. S. and Desai, S. N., (2010), Clinical management of scabies in rabbit. Intas Polivet, **11**: 112-114.

Galdhar, C. N., Khangal, P. S, Pawar, M. L., Rasal, T. D. and Digraskar, S. U., (2015), Clinico-biochemical and therapeutic studies on notoedric mange in pet rabbits. *J. Parasitic Diseases.* **39**(1): 113–116.

Gortazar, C., Villafuerte, R., Blanco, J. C. and Fernandez deLuco, D., (1998), Enzootic sarcoptic mange in red foxes in Spain. *Z. Jagdwiss,* 44:251-56.

Kachhawa, J. P., Kachhawa, S., Srivastava, M., Chahar, A. and Singh, N. K., (2013), Therapeutic management of scabies in rabbits. *Intas Polivet,* **14** (11): 306-308.

Kumar, N., (1999), Studies on rabbit mange with special reference to elvaluation of recent chemotherapeutic agents against rabbit mange. Post Graduate Thesis, Punjab Agricultural University, Ludhiana, India.

McCarthy, J., Kemp, D., Walton, S. and Currie, B., (2004), Scabies: more than just an irritation. *Post. grad. Med. J.,* 80: 382-87.

Oraon, B., Thakur, D. K., Singh, S. K. and Gupta, M. K., (2000), Clinic-pathological changes in pigs experimentally infected with Sarcoptes scabiei. *Indian J. Anim. Sci.,* 70: 405-06.

Rehbein, S., Visser, M., Winter, R., Trommer, B., Matthes, H.F., Maciel, A. and Marley, S., (2003), Productivity effects of bovine manage and control with ivermectin. *Vet Parasitol.* 114: 267-84.

Panigrahi PN and Gupta AR, (2013), Therapeutic management of concurrent sarcoptic and psoroptic acariasis in rabbits. Intas Polivet , **14**(11): 319-321.

Wall, R. and Shearer, D. (1997). Veterinary Entomology. 1st ed. Chapman and Hall, London.

Walton, U. K., Holt, S. F., Currie, D. C., and Kemp, D. J., (2004), Scabies: new future for a neglected disease. *Adv. Parasitol.,* **57**: 309-76.

White, S. D., Bourdeau, P. J. and Meredith, A., (2003), Dermatologic problems of rabbits. Compend. *Contin. Educ. Pract. Vet.,* 25: 90-101.

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Heart failure due to Ventricular tachycardia in a pigeon

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(received 14/09/2016 - accepted 12/01/2017)

Abstract :
A case of heart failure due to ventricular tachycardia was diagnosed in a pigeon and unique record of heart failure due to ventricular tachycardia in a living domestic pigeon is reported.

Key words : Electrocardiography, pigeon, ventricular tachycardia,

Introduction

Cardiac diseases in cage birds are common and have been accounted for nearly half deaths yearly in pigeons in United states (Penn *et al.*, 1990). Symptoms of cardiac ailments in avian species are often nonspecific and accompanied concurrent diseases disguise the clinical picture making the diagnosis a difficult task until the heart decompensate. Diagnostic techniques for evaluating heart in living avian species are limited by the size of the patients and high heart rates. Recently, a case of cardiomyopathy has been reported in a parrot (Varshney, 2014). It seems that diagnosis of cardiac diseases in living pigeons has not been made in India. Therefore, a clinical case of heart failure due to ventricular tachycardia in a pigeon is put on record and discussed.

History, Clinical and Electrocardiographic investigations

A pigeon was brought at the hospital in semi conscious condition with the history of fall as an emergency case. Clinical examination revealed shortness of breath, marked weakness, lethargy, gasping, fatigue and semiconciousness with bluish discoloration of tips of the limps and toes, and cold toes. The pigeon was immediately subjected to electrocardiography. Leads were attached on the right wing (RA), left wing (LA) and left leg (LL), and right leg(RL) at gastrocnemius muscle as shown in the Fig 1. Feathers were clipped on the proximal part of the rachis of the feathers and gel was applied liberally between skin and clips. Lead I, II, III, aVR, aVL and aVF were recorded at 1 mV = 10 mm, with paper speed of 25 mm/s.

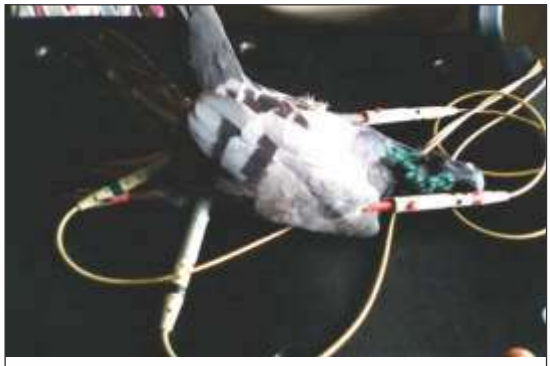

Fig. 1. ECG lead placement in the pigeon. Leads were attached on the right wing (RA), left wing (LA) and left leg (LL), and the right leg (RL) at gastrocnemius muscle . Lead I, II, III, aVR, aVL and aVF were recorded at 1 mV = 10 mm, with paper speed of 25 mm/s.

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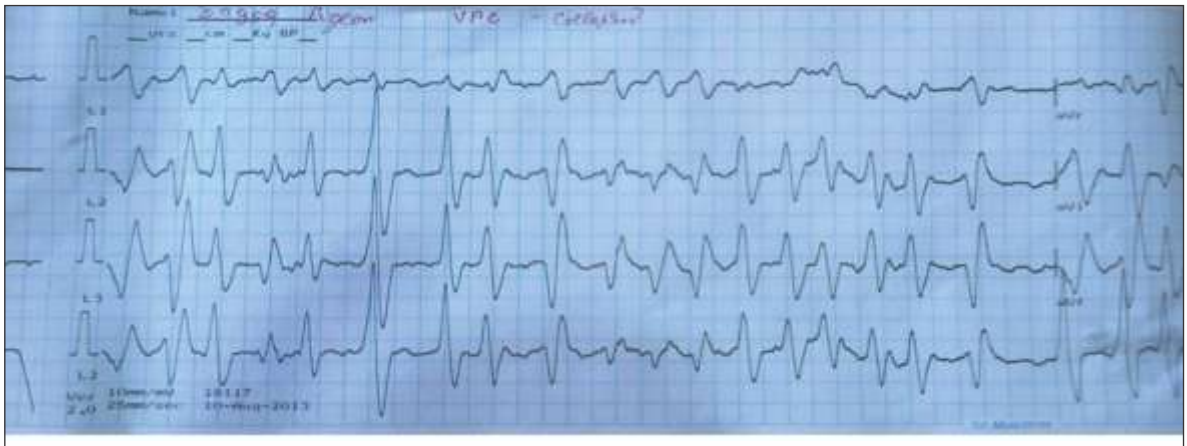

Fig2. Electrocardiogram showing multiform (varying configuration of ventricular complexes) ventricular tachycardia at an average of 140 /min. in a pigeon with syncope. The 4th, 10th 11th and 12th complexes from the beginning of the strip are a capture complex. The normal sinus impulse has reached the AV junction capturing the ventricles for one complex.

Diagnosis and Discussion

Clinical signs of shortness of breath, gasping, marked weakness, lethargy and semiconciousness with change in color of tips of the limps and toes were suggestive of compromised cardiovascular system. The diagnosis of cardiovascular diseases in living birds is difficult as there is no palpable pulse and auscultation is difficult to interpret owing to fast heart rate leaving electro and echocardiography as only means to evaluate the heart. Using electrocardiography and cardiac troponin-I, a case of cardiomyopathy has recently been reported in a parrot (Varshney,2014). Electrocardiogram in the present case revealed aberrant wave forms (VPC) in runs having wide QRS unrelated to 'P' wave (Fig.2) and of different configurations in lead I,II,II, aVR, aVL and aVF suggesting multifocal ventricular tachycardia. Ventricular tachycardia is 3 or more ventricular premature complexes in a row resulting from stimulation of an ectopic focus in ventricle and may occur during the period of hypoxia in birds and has been associated with hypokalaemia, thiamine deficiency, vitamin E deficiency, New castle disease, avian influenza or myocardial infarction in birds (Doneley, 2010) Ventricular tachycardia is one of the most serious and potentially life threatening arrhythmias owing to its association with serious heart disease or metabolic derangements. The pigeon collapsed due to acute heart failure owing to multiform ventricular tachycardia. This seems to be the first record of a clinical case of acute heart failure due to multiform ventricular tachycardia in a living domestic pigeon in India.

References:

Doneley, B., (2010), Avian Medicine and Surgery in Practice, companion and aviary birds Manson Publishing Ltd, London, U.K. 191-199.

Penn, A., LuMx and Parkes, J. L., (1990), Ingestion of chlorinated water has no effect upon indicators of cardiovascular diseases in pigeons. Toxicology **63**:301-313.

Varshney, J. P., (2014), Cardiomyopathy in a parrot - A clinical case report. The Blue Crossbook **30**:61-62.

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Non Surgical Management of Esophageal Foreign Body Obstruction in A nondescript Puppy

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(received 08/02/2017 - accepted 10/05/2017)

Abstract :

A 40 days old nondescript puppy was presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Hassan, with the history of tapioca ingestion, absence of food and water intake and absence of urination and defecation from past 36 hours. Clinical examination revealed marked dehydration, depression, gagging, respiratory distress and repeated attempts to swallow. On physical palpation no foreign body could be detected. Plain radiographs and Contrast radiograph of the neck and thorax revealed foreign body obstruction in oesophageal lumen at the base of heart. The pup was stabilised with intravenous fluids and oral glycerine was given until it shows nausea and relaxed. Next day animal started taking food and water normally and afterwards urination and defecation also observed indicative of no obstruction confirmed by passing endotracheal tube into the stomach. So, in this case we observed and reported that glycerine can be used successfully to relieve the oesophageal foreign body, when the foreign body is blunt and no chances for oesophageal perforation.

Key words: Esophagus, Foreign body, Obstruction, Puppy

Introduction

Foreign bodies are the inanimate objects that may cause obstruction or partial obstruction of oesophageal lumen. Oesophageal foreign bodies are most common in dogs and cats. They are bones, needles, fish hook, wood, dental chew treats, balls, and others. Foreign bodies lodge in oesophagus because they are too large to pass or they have sharp edges that embedded in oesophageal mucosa. Foreign bodies most commonly found at thoracic inlet or base of heart or epiphrenic area because oesophageal structure limits oesophageal dilatation at these sites. Esophagitis, mucosal laceration, oesophageal stricture, oesophageal diverticulum formation are potential complications.

Case History and Observations

A 40 days old nondescript puppy was presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Hassan, with the history of tapioca ingestion, absence of food and water intake and absence of urination and defecation from past 36 hours. Clinical examination revealed marked dehydration, depression, gagging, respiratory distress and

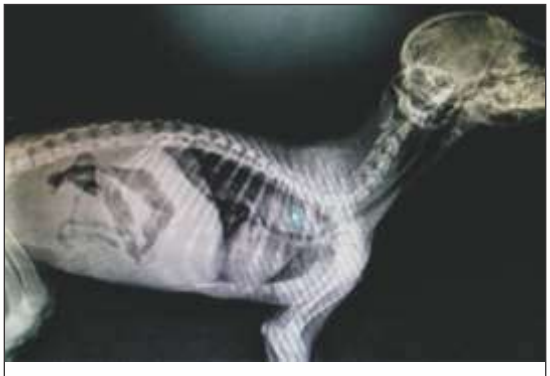

Fig.1: Foreign body in oesophageal lumen at the base of heart

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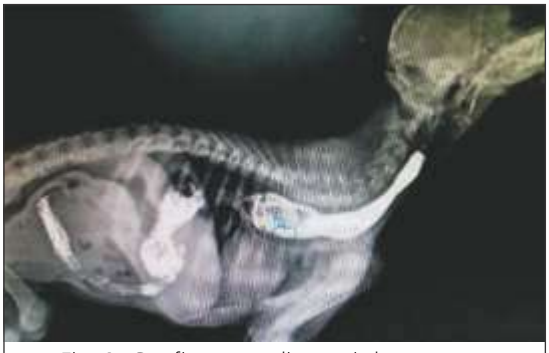

Fig. 2: Confirmatory diagnosis by contrast radiography using barium

repeated attempts to swallow. Rectal temperature was 101.8^{0}F. On physical palpation, no foreign body could be detected. Plain radiographs of the neck and thorax revealed foreign body obstruction in oesophageal lumen at the base of heart (Fig.1). Since clear history of tapioca ingestion and no chance for oesophageal lumen perforation, confirmatory diagnosis was done by using barium swallowed contrast radiography (Fig.2).

Treatment and Discussion

The initial treatment was carried out to stabilize the animal using intravenous DNS and RL fluids combination @ 20ml/kg. Ceftriaxone given @ 25 mg/kg IV and Meloxicam @ 0.2 mg/kg IM and same treatment repeated after 12 hours except meloxicam. Oral glycerine liquid was given @ 1-2 g/kg per orally. After 5 min animal started nausea and regurgitated part of tapioca. Next day animal started taking food and water normally and afterwards urination and defecation also observed indicative of no obstruction confirmed by passing endotracheal tube into the stomach (Fig.3).

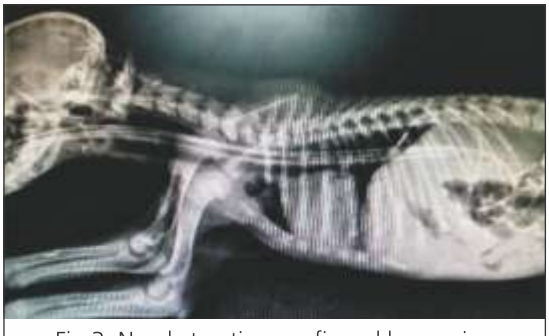

Fig.3: No obstruction confirmed by passing endotracheal tube into the stomach

Oesophageal foreign body is most common in dogs and cats. It may be complete or partial obstruction. The signs varies depends on location foreign body and duration of obstruction. Line of treatment includes patient stabilization and removal of foreign body as early as possible by surgically or endoscopically with grasping instruments and forceps or by using balloon catheter method.

In this case medically used oral glycerine liquid, which is having lubricant, humectant, emollient and soothing properties was used. These properties aids in easy passage of tapioca from oesophagus to stomach. Thus, it is observed that glycerine can be used successfully to relieve the oesophageal foreign body, when the foreign body is blunt and no chances for oesophageal perforation.

A case of tapioca obstruction in oesophageal lumen was successfully relieved in a puppy by using oral glycerine.

Acknowledgement

The authors are thankful to Department of Veterinary Surgery and Radiology, Veterinary College, Hassan for the facilities provided.

References

Cynthia M. Khan, Scott Line and Susan E. Aiello. 2010. The Merck Veterinary Manual. 10th edn.344

Theresa Welch Fossum, Cheryl S. Hedlund, Donald A. Hulse, Ann L. Johnson, Howard B. Seim 111, Michael D. Willard, Gwendolyn L. Carroll. 2002. Small Animal Surgery. 2nd edn. 318-321

Mario Pagliaro and Michele Rossi. 2008. The Future of Glycerol: New Uses of a Versatile Raw Material. 1:18

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Therapeutic management of canine malasseziosis

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Abstract:
Malasseziosis is frequently associated with seborrheic dermatitis in dogs caused by *Malassezia pachydermatitis.* The successful therapeutic management of canine malasseziosis in eight dogs lesion of dermatitis were selected for this study. There was no side effects of the drugs, neither the recurrence observed.

Key words: Malasseziosis, seborrheic dermatitis, dogs, therapeutic managent.

Introduction:

Malasseziosis is frequently associated with seborrheic dermatitis in dogs caused by *Malassezia pachydermatitis*. Several predisposing factors play role in canine malasseziosis, include various allergic conditions, bacterial infection and inflammatory status of the skin that helps in the proliferation of the yeast.

History & clinical signs :

A total of 8 dogs of various age, sex and breed with lesion of dermatitis presented to Campus Veterinary Hospital, College of Veterinary Science, Rajendranagar were selected for this study. All these dogs had history of pruritis, exudation and alopecia along with normal appetite, defecation and general demeanour. The characteristic of skin lesions varied from dry, scaly, erythematous to moist, the inflammatory signs like erythema & exudatous nature, continuous pruritus , thickening of skin at neck, abdomen, inguinal and inter digital area. The dogs exhibited rancid i.e. greasy odour and seborrheic lesions. The skin appears like elephant skin. Some dogs also revealed otitis externa lesions.

Fig. 1: Allopecia, seborrhoea and thickening skin of dog.

Diagnosis:

The skin scrapings were collected from moist exudation lesions, using sterile cotton swab and by pressing adhesive tapes over the dry scaly lesions. The sample was transferred to the glass slides and heat fixed. Later the slides were stained by diff quick method using New Methylene Blue stain and then examined under oil immersion. Dog suffering with malasseziosis revealed dark foot print like structures of yeast (*Malassezia pachydermatis*).

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Fig. 2: Collection of tape impression smears.

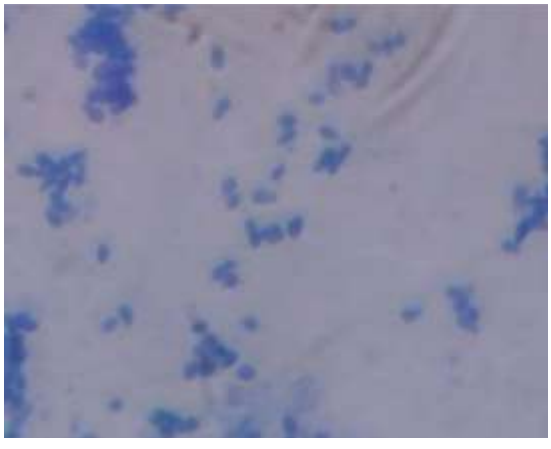

Fig. 3: Blue coloured footprint shaped yeast organism- *Malassezia pachydermatitis.*

Treatment:

The dogs suffering from malasseziosis disease were treated with tab. Pet oral K (ttk pharma) containing 200 mg ketoconazole at the rate of 5-10 mg/kg body weight a day. Ketoconazole might have favourably modulated epidural cell physiology, cutaneous inflammation and hormonal activity in skin and hair follicle (Ramprabhu et al., 2003) and anti-inflammatory properties (Ikhre, 1996). Uchida et al (1992) reported that the ketaconazole may also act synergistically with the leukocytes to disrupt the fungi. Levomisole hydrochloride (immunostimulant) @ 2.5 mg/kg was given 10-14 days to hasten up recovery ketochlor shampoo was used for bathing and omega fattyacids containing syrup like Vitabest derm @ 10ml twice daily for 30days was given. The complete recovery of signs occurred within 30 days. Better recovery obtained in similar cases by using shampoo contain selenium disulphides (Evans 1991).

The clinical observations and cytological analysis were carried out at weekly intervals up to four weeks after institutional of therapy. Therapeutic efficacy was assessed by the time taken for onset of recovery signs to complete recovery with complete absence of clinical signs and without any recurrence.

Reference:

Ramprabhu, R., Nambi, A.P., Prabhu, S., Senthilvelan, A., Sunder, N. and Dhanapalan, P. 2003. Malassezia pachydermatitis in a dog--a case report. Indian Vet. J. 80: 691-692.

Uchida,Y., Mizutani, M., kubo, T., Nakode, T and Otomo, K.1992. Otitis externa induced with Malassezia pachydermatitis in dogs & the efficacy of pimericin. J. Vet. Med. Sci. 54: 611-614.

Ihkre. 1996. Proceedings of North American Veterinary conference on Antimicrobial therepy; Applications in Dermatology. Vol.2, Oxford Pergamon Press, UK.

Evans A.G. 1991. Difficult dermatological diagnosis. J. American. Vet. Med. Assoc. 198: 1141-1142.

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An emergency whole blood transfusion in a native breed dog

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Abstract :

A native breed dog was presented to local veterinary dispensary with complaints of general weakness, off feed, and exhibited following clinical signs like pale gums, mucous membrane, hypothermia, severe dehydration, shallow breathing and significant weight loss all suggestive of anaemia. The dog was on current status regarding de worming and vaccination. On further laboratory investigation of blood sample the blood picture revealed PCV - 13% and Hb - 5 gm/dl and dog was in a state of circulatory shock. Thus after realising the urgency and time limitation it was decided to go for an emergency blood transfusion on the next day after correcting the initial fluid and electrolyte imbalance with preliminary fluid therapy.

Keywords: Dog, blood loss ; anaemia, whole blood transfusion

Introduction :

In recent times canine blood donation and blood transfusion is gaining popularity among the pet owners as well as most of the pet animal practising veterinarians. It has been recognised as an important and novel attempt in managing life threatening situations that replaces lost blood. As veterinary critical care becomes more and more sophisticated, the advantages of a basic knowledge of transfusion therapy is increasingly apparent .

Among the first and fore most important indications for whole blood transfusion in dog includes anaemia and acute massive blood loss[1] caused by mechanical trauma, sharp cut injuries and in case of road accidents that resulted in voluminous blood loss that warrants immediate medical intervention.

History :

A male dog that belongs to native breed weighing 18 kg and aged 3 years was presented to the local veterinary dispensary outpatient ward with complaints like lack of alertness dullness, depression, general weakness, off feed pale gums. It was reported that the same dog had suffered with severe tick infestation two weeks earlier.

Clinical Findings :

Routine clinical examination of the patient revealed general lethargy, severe dehydration , pale mucous membrane, rapid respiration, thready pulse, with temperature 103.3 F, slightly enlarged abdomen and significant weight loss as reported by the pet animal owner.

Palpation of important lymph nodes such as pre-scapular and popliteal were performed to get possible clues about involvement of blood protozoan infections such as echrlichiosis,

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babesiosis and was found to be normal in size.

Diagnosis :

Blood tests of the affected dog included peripheral smear examination and complete blood cell count. On further investigation of blood sample the result was suggestive of anaemia as the two important blood parameters like Packed cell volume (PCV) and Haemoglobin (Hb) with following values viz, (PCV -13% and Hb- 7gm /dl). Finally it was concluded that the values were well below the normal range and the animal was declared as anaemic.

Packed Cell Volume (PCV: 35 % to 55 %) , Haemoglobin (Hb – 14- 20 gms /dl) is the normal range.

The smear was also negative for blood borne intra cellular and extra cellular organisms like (B. canis and E. canis).

Based on history, clinical examination and blood sample investigation report the animal was confirmed as severely anaemic that required whole blood transfusion for its survival.

Donor and Recipient Dog

Treatment Schedule :

On the first day, the animal was treated for correction of generalised dehydration and electrolyte imbalance using Dextrose with Normal Saline (DNS) and Ringer's Lactate (RL) solutions @ dose rate of each 300ml and 200 ml respectively via intravenous route .

In addition injections such as Amoxirum forte 300mg[a] i/m, Tribivet[b] @ a dose rate of 2ml i/m, Avilin[c] @ a dose rate of 1ml i/m, Prednisolone[d] @ a dose rate of 1ml i/m were given as a routine treatment .

a- Brand of Virbac Animal Health, Mumbai

b- Brand of Intas Animal health, Ahmedabad.

c & D - Brand of MSD Animal health, Pune

e- Brand of Jagdale Life Sciences, Bangalore

f- Brand of Intas Animal Health, Mumbai

Donor Dog Selection

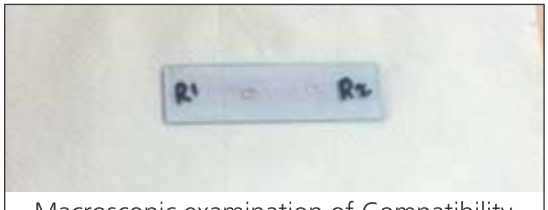
On the same day another docile, healthy native breed male dog weighing 27 kg, aged 4 years, well maintained and on current status regarding deworming and vaccinations was selected to serve as a donor animal.

Blood samples were collected separately from both recipient and donor for further investigation like major and minor cross matching as below.

Blood Samples of Donor and Recipient Dog

Donor dog's blood sample was analysed and results were found to be satisfactory with PCV-40% and Hb-12.7gm/dl and absence of blood borne organisms . Hence it was declared as fit for blood donation.

Based on cross - matching test results of both donor and recipient blood were found to be compatible which was confirmed by macroscopic examination of the samples as below.



Macroscopic examination of Compatibility

Cross-Matching Tests:

Major Cross-Match - Involes mixing of both (Donor Cells+Recipient Serum) in a test tube.

Minor Cross-Match - Involves mixing of both (Donor Serum+Recipient Cells) in a test tube .

To check compatability the major and minor cross match samples were examined both macroscopically and microscoically for agglutination reactions .

In the present case both the Cross-Matching were carried out to ensure accuracy of compatability between donor and recipient blood.

Microscopic examination of Agglutination reaction for compatability between donor and recipient.

Calculation of exact amount of whole blood requirement :

Normal blood volume is assumed as 8 % .4 Based on the following formula

Litres of blood lost = (Normal PCV- Patient PCV/ 0.08*Patient Wt.kg

If we assume normal PCV to be 40% then 2.2 ml of whole blood / kg will increase the PCV by 1%.

Volume to be transferred = Body wt (kg)*K* (Desired PCV- Recipient PCV/ Donor PCV.

Where K=88 for dogs.

As per the above formula the volume of blood lost by the recipient dog was estimated as 437ml and to raise recipient's PCV to 20% the volume of whole blood needed for transfusion was estimated at 352ml.

Discussion :

On the next day the selected donor dog was brought for blood donation on empty stomach and placed in lateral recumbency without sedation as sedation is optional for canine donors. Then neck region was shaved properly and made sterile by wiping the site with spirit and cotton swab. After properly restraining the donor the jugular vein was raised and using, the needle 16 G present at one end of the collection tube was inserted in to the jugular vein and blood started collecting in to the blood bag with capacity 350ml.

During collection the blood bag was held below the donor's table level on a tray and gently agitated to enable better mixing of whole blood with anticoagulant present inside the blood bag and throughout the blood collection donor's vital parameters like pulse rate ,quality, respiration rate were constantly monitored till the completion of the blood collection5 (in this case 25min).

Once the collection was over the donor dog was offered a small meal and plenty of water and was able to walk freely on its own without any external assistance. As in the below picture indicates successful blood collection from the donor.

(Donor blood collected and ready for Transfusion)

Estimation of appropriate amount of blood requirement and adopting proper methodology of blood collection from the donor are the two

most important aspects to be followed especially in case of dogs for the successful procedure of the blood transfusion therapy.

Blood Transfusion to Recipient Dog

On successful completion of blood collection from the donor, physical examination of recipient was done immediately. As a prophylactic measure to prevent onset of any anaphylactic reactions during transfusion injections such as Avilinc @ a dose rate of 1ml and Prednisoloned @ a dose rate of 1ml by intramuscular route were given. Before the transfusion, base line evaluations of the recipient's attitude , rectal temperature ,pulse rate and quality, respiratory rate and character, mucous membrane colour, and capillary refill time were made.

After the base line study, the transfusion was started slowly after locating the cephalic vein on the left forelimb. The one end of the transfusion set was connected to the blood bag that contained donor's blood and the other end was connected to the scalp vein needle that was inserted in to the cephalic vein. In the beginning of transfusion the rate of the transfusion was adjusted to 0.25ml/kg 3 for the first 30 min and the recipient's vital parameters like pulse rate, respiration rate, mucus membrane, capillary refill time (CRT) were continuously monitored for any signs of reaction , starting with first 30 min, 45 min,1 hr and there after every 30 min and so on. The whole volume of 350 ml of blood transfusion took nearly 2hours and 20 minutes and there was no episodes of any adverse reactions. On completion of transfusion the recipient was immediately examined for imminent possibility of anaphylactic reactions. The recipient dog was continuously monitored for the consequent 4 days as a follow up protocol to ascertain development of any delayed types of adverse reactions. In addition to whole blood transfusion the recipient was also prescribed with oral haematinics with multi vitamins and amino acids containing preparation syrup like Elemental –F e BID @ 10 ml p/o and Livotasf Syrup @ 10 ml BID p/o.

Conclusion :

After a period of three weeks of time had passed once again the recipient blood sample was analysed to ascertain the PCV and Hb status. It was found to be improved with following values PCV-26% and Hb 11.5g/dl

Summary :

In short , ensuring a safe and successful blood transfusion in dogs involves by making sure that integrity is maintained throughout the whole process. This begins with choosing a suitable donor, through safe collection and administration of the donor blood, including post-transfusion evaluation for any reactions that may have occurred.

The commercial availability of point-of-case blood typing , cross- matching kits and blood bag should enable veterinary practitioners to administer appropriate transfusion with minimal risk of elucidating an immune mediated transfusion reaction.

References :

Caroline Kisielewicz and Ian A self (2014). Canine and feline blood transfusion; controversies and recent advances in administration practices. Vol. 2: 123-136

Davidow B. Transfusion Medicine in Small Animal Practice 2013; Vol. 23: 735-756

Green CE: Blood Transfusion Therapy :An updated Overview. AAHA49:Annu.meet. Proc: 187-189, 1982.

Killingsworth CR:Use of Blood and Blood Components for the Canine Patient. Vet. Critical Care 7(1) : 6-10,1984.

Willer,Randy L.and Riedesel,Dean H.(1985) Transfusion Therapy and Blood Banking in the Dog and Cat" iowa state university.

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Under explored Treatment Options for Repeat Breeding in Bovines

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Abstract:

The study was conducted on 130 repeat breeding bovines randomly divided into two groups each comprising of 45 buffaloes and 20 cows. The animals in group I were administered mineral mixture and the animals in group II were treated using Homeopathic remedies. The number of animal exhibiting early and pronounced signs of estrus and conception rate was more in group II. Homeopathic medication was a cheaper and effective option for treatment of infertility problems in bovines.

Key words: Repeat Breeding, Bovines, Homeopathy, Mineral Mixture.

Introduction:

Reproductive performance is a major factor affecting the production and economic efficiency of dairy herds (Noakes, 2009). Infertility can be a serious problem in high yielding dairy cows. The challenge to improve the reproductive performance of lactating dairy cattle requires an understanding of the biochemical and physical principles controlling reproduction and lactation. This then needs to be integrated into production and reproduction management systems to optimize the fertility of the animal (Jayanthi *et al.*, 2003). Several methods have been tried to increase conception rates by improving nutritional status and correction of deficiency of minerals, vitamines and hormones (Sharma *et al*. 2003). The present article records on account the use of homeopathic remedies for treatment of non specific repeat breeding problems in bovines.

Materials and Methods:

The study was conducted on 130 repeat breeding bovines (90 buffaloes and 40 cows) presented to Veterinary dispensary, Yamakanmardi, Dt: Belgaum, Karnataka from 2008 to 2012, irrespective of their age and stage of lactation. The cases were randomly divided into two equal groups comprising of 65 animals (45 buffaloes and 20 cows) in each group. The animals in general were managed by all farmers under nearly similar environmental feeding and managemental conditions. All the animals were dewormed thrice with broad spectrum antihelminthics, once every 15 days. In group I animals, mineral mixture @ 30gms per day per orally was administered. In group II animals Homeopathic remedies were administered in two stages. In stage I, a combination of Five phos 30 + Alfalfa 30 as 60 mm size pills @ 10 pills bid for 20 days followed by a combination of Cal phos 30 + Phosp 30 + Aur. mur. Nat 30 + Alethris Far 30 + Sepia 30 and Pulsatilla 30 as 60 mm size pills @ 10 pills bid for 20 days was administered in stage II. The animals were observed for signs and intensity of estrus. All the animals were artificially

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inseminated around mid estrus. In both the groups, the treatment was continued for 20 days after insemination and was discontinued if the animals did not exhibit signs of estrus. All cases were examined for pregnancy three months after artificial insemination.

Results And Discussion:

In group I, 49.23% got conceived after insemination during 1st estrus, 30.76% got conceived after insemination during 2nd estrus after treatment. However, 20.0% animals did not conceive even after 3rd estrus, in which ultrasound scan was performed to identify the specific cause and synthetic hormones were used accordingly for treatment of these cases.

In group II, 63.08% got conceived after insemination during 1st estrus, 32.31% got conceived after insemination during 2nd estrus after treatment. However, 4.62% did not conceive even after 3rd estrus, in which ultrasound scan was performed to identify the specific cause and synthetic hormones were used accordingly for treatment of these cases.

The homeopathic combination used in the study, normalizes function of ovary, reduces and regulates ovulatory estrus cycle. It controls infection and inflammation of reproductive tract. It increases conception rate by normalizing uterine and ovarian function, stabilizes calcium and phosphorus deficiency and abnormalities of genitalia. It does not affect mammary function in high lactating animals. There is no danger of hyperstimulation of ovaries or cystic ovarian degeneration as seen with hormone preparation as reported by Ashwani, 2010; Dhama and Dhama, 2010.

Both buffaloes and cows responded well to the treatment and exhibited no noticeable side effects. The number of animal exhibiting early and more pronounced signs of estrus was more in group II. The overall conception rate was more in group II animals. Animals in both the groups needed additional treatment. The average cost of treatment per animal in group I was Rs 300 = 00 and the cost of treatment in group II was Rs 150 = 00. The combination of Homeopathic medicines used in the present study can be used as a cheaper alternative for effective treatment of repeat breeding cases in bovines.

Acknowledgement:

The author is thankful to Dept. of AH & VS, Govt. of Karnataka for supporting to carry out the needful work and to Dr. Poshak Patel. Joint Director, Dept. of VS. Govt. of Gujarat for his personal guidance in treating the cases.

References:

ASHWANI, B., (2010), A Complete Guide to Homeopathic remedies, Goodwill publication house. New Delhi.

BEEVAR, D.E., (2006), The impact of controlled nutrition during the dry period on dairy cow health, fertility and performance. Anim Reprod.Sci., **96**:212-26.

Behera, P. C., Das, M., Tripathy, D. P., Panigrahi B. and Panda N., (2012), Mineral supplementation and its relevance in improving conception rate in anestrus and repeat breeding heifers, Intas Polivet. **13** (1): 17-12.

Boericke, W., (2008), Pocket Mannul of Homeopathic Material Medica and Repertory, Jain Publishers Pvt Ltd. New Delhi.

CUPPS, P.T., (2009), Reproduction in Domestic Animals. 4th edition. Academic press.

Dhama, K. P. S and Dhama, S., (2010), Homeopathy-The Complete Handbook. UBS Publishers and Distributors Pvt Ltd. New Delhi.

Jayanthi, N., Chellapandian, M. and Balachandran S., (2003), Blood biochemical profile of repeat breeding

cows in Tirunelveli region of Tamil nadu, Ind. Vet. J. **80**: 939 - 40.

Madrewar, B. P., (1996), Therapeutics of Veterinary Homeopathy, Jain Publishers Pvt Ltd: New Delhi.

Noakes, D. E., Parkinson, J. J. and England, G. C. W., (2009), Veterinary Reproduction and Obstetrics. 9th edition. Sauders Publication.

Sharma, M. C., Raju, S., Joshi, C., Kaur, H. and Varshney, V. P., (2003), Studies on serum micro minerals hormone and vitamin profile of buffaloes, its effect on production and theraupeutic management in Haryana state of India. Asian-Australian.J. Anim.Sci.**16**: 519-28.

Vishwanatha, R. V. N., (1994), Diagnosis and treatment of reproduction disorders in dairy cows. Vijaya Scientific Publishers. Bangalore.

Metabolic and Mineral deficiency diseases of animals

Cobalt deficiency

It is characterized by anorexia, wasting, gradual reduction in appetite, weakness, paleness of mucus membranes, decreased wool production and tenderness of wool.

Treatment:

Use cobalt sulphate orally. Dose in cattle, buffaloes – 500 mg/day, in sheep, goat, calf, lamb, kid – 0.50 mg/day

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Herbals and Nutraceuticals: Therapeutic Value and Drug Interactions

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Abstract :

Herbal remedies include dietary supplements (any product other than tobacco intended for ingestion as a supplement to the diet, including vitamins, minerals, anti-oxidants – and herbal products), phytomedicines (the use of plants or plants components to achieve a therapeutic effect/outcome) and botanical medicines (botanical supplements used as medicine). From a therapeutic perspective, many concerns arise from the easy and widespread availability, lack of manufacturing or regulatory oversight, potential adulteration and contamination of these herbal products. Furthermore, there is often little or no rigorous clinical trial evidence for efficacy and only anecdotes about toxicity. Here we focus on commonly used herbal and nutraceutical products that may cause pharmacologicaleffects.

Keywords: Herbs, Nutraceutical, Drug interactions

Introduction

Alternative therapies (i.e. alternative to licensed products of proven quality, safety and efficacy) span a huge range from frank charlatanry (e.g. products based on unscientific postulates, composed of diluent or of snake oil), through physical therapies such as massage and aroma therapies, which certainly please ('placebo' means 'I will please') and do a great deal less harm than some conventional therapies (e.g. surgery, chemotherapy),through herbal medications with undoubted pharmacological activity and the potential to cause desired or adverse effects, albeit less predictably than the licensed products that have been derived from them in the past and will no doubt be so derived in the future. Overall, efforts to test homeopathic products have been negative (Ernst, 2002) and it has been argued that no more resource should be wasted on testing products on the lunatic fringe, even when they come with royal endorsement and (disgracefully) public funding.

The recent increase in the use of herbal remedies by normal healthy humans, as well as patients, is likely to be multi-factorial and related to: (1) patient dissatisfaction with conventional medicine; (2) patient desire to take more control of their medical treatment; and (3) philosophical / cultural bias. At a clinical therapeutic level, it is disconcerting that 15–20 million Americans regularly take herbal remedies, while concomitantly receiving modern prescription drugs, implying a significant risk for herb–drug interactions. Many patients who are highly attuned to potential harms of conventional drugs (such as digoxin, a high quality drug derived historically from extracts of dried foxglove of variable quality and potency) fail to recognize that current herbals have as great or greater

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potential toxicities, often putting their faith in the 'naturalness' of the herbal product as an assurance of safety. This digest briefly reviews the most commonly used herbals from a therapeutic perspective and addresses some of the recently identified problems caused by these agents.

Garlic

Garlic has been used as a culinary spice and medicinal herb for thousands of years. One active compound in garlic is allicin, and this is produced along with many additional sulphur compounds by the action of the enzyme allinase, when fresh garlic is crushed or chewed. Initial clinical trials suggested the potential of garlic to lower serum cholesterol and triglyceride, but a recent trial has shown limited to no benefit. Garlic has been advocated to treat many conditions, ranging from many cardiovascular diseases, e.g. atherosclerosis including peripheral vascular disease, hypertension, lipid disorders and sickle cell anaemia. Garlic can alter blood coagulability by decreasing platelet aggregation and increasing fibrinolysis.

Adverse effects

The adverse effects of garlic use involve gastro-intestinal symptoms including halitosis, dyspepsia, flatulence and heart burn. Other reported adverse effects include headache, haematoma and contact dermatitis.

Drug interactions

Garlic inhibits many drug-metabolizing (CYP450) enzymes *in vitro*, but induces CYP450s when administered chronically *in vivo*. Clinical studies using probe-drug cocktails have shown that garlic has no significant effect on the activity of CYP1A2 **(caffeine)**, CYP2D6 **(debrisoquine, dextrome-thorphan)** and CYP3A4 **(alprazolam, midazolam)**. Clinical studies suggest that the bio availability of **saquinavir** and **ritonavir** is significantly decreased with garlic. These HIV protease inhibitors are not only metabolized by CYP3A4, but are also substrates for P-glycoprotein.

Ginseng

There are several types of ginseng (Siberian, Asian, American and Japanese), the most common type used in herbal preparations being the Asian variety *(Panax ginseng)*. In humans, ginseng has been suggested to be a sedative-hypnotic, anaphrodisiac, an antidepressant and a diuretic, and therapeutic benefits have been claimed for many indications (see below). Its pharmacologic properties include actions as a phyto estrogen, suggesting that its use, as with soy supplementation, could be disadvantageous in women with oestrogen-sensitive cancers (e.g. breast or endometrium). The active component of ginseng, ginsenoside, inhibits camp phosphodiesterase and monamine oxidase. These properties may partly explain purported central nervous system (CNS) stimulant actions of ginseng (though not sedative/hypnotic effects), potential modulation of the immune system and increase of glycogen storage. However, possible efficacy of ginseng in improving physical or psychomotor performance, cognitive function, immune function, diabetes mellitus and herpes simplex type 2 infections is not established beyond reasonable doubt.

Adverse effects

The adverse effects of ginseng are primarily CNS effects as agitation, irritability, insomnia and headache. Others noted effects include hypertension and mastalgia.

Drug interactions

In vitro evidence suggests that ginseng extracts inhibit CYP3 A4 in human hepatocytes. These *in vitro* data are consistent with study data during an 18-day course of ginseng, where it

significantly increased the peak plasma concentration of **nifedipine**, a CYP3A4 substrate, in healthy volunteers.

Ginkgo Biloba

Originating from Chinese medicine, ginkgo (derived from the nuts of *Ginkgo biloba* - a beautiful and threatened tree rather than the western culinary stereotype of a 'herb') is used for a variety of ailments and has multiple purported actions, including antihypoxic, antioxidant, anti platelet, free radicals cavenging and micro circulatory properties. It has been used in patients with asthma, brain trauma, cochlear deafness, depression, retinitis, impotence, myocardial reperfusion and vertigo. The evidence for efficacy in many of these conditions is unconvincing. A recent clinical trial, in which a leading ginkgo extract did not improve cognitive function, may have contributed to a decline of ginkgo from the top-selling position it had held among such products since 1995. One of the principal components of ginkgo, ginkgolide B, is a moderately potent antagonist of platelet-activating factor. 'Anti-stress' effects claimed for ginkgo products are postulated to be due to monamine oxidase inhibition by ginkgolides.

Adverse effects

Serious or fatal side effects of gingko include spontaneous bleeding, fatal intra cerebral bleeding, seizures and anaphylactic shock. Less serious side effects are nausea, vomiting, flatulence, diarrhoea, headaches and pruritus.

Drug interactions

In vitro data suggest ginkgo can inhibit hepatic drug metabolizing enzymes. Long-term administration of ginkgo to volunteers (for up to 28 days) had no effect on the pharmacokinetics of **midazolam**, a marker of CYP3A4 activity. In another study, however, ginkgo increased the plasma concentrations of the CYP3A4 substrate **nifedipine** by 53%, confirming the potential for enzyme inhibition observed *in vitro*. The discrepant findings for effects of ginkgo on CYP3A4 observed in this trial and in the phenotyping studies is possibly related to the highly variable phytochemical composition of commercially available ginkgo extracts. The potential importance of the change in CYP2C19 activity noted previously in a cocktail screening approach, was verified by the observation that ginkgo significantly reduced the metabolism of **omeprazole,** a CYP2C19 substrate, in Chinese patients. Collectively, these clinical data indicate that ginkgo may interfere with the pharmacokinetics of drugs metabolized by CYP2C19 or CYP3A4. If it does inhibit MAO at therapeutic doses, adverse interactions with tyramine containing foods and possibly with selective serotonin reuptake inhibitors (SSRI) are to be anticipated.

Echinacea

Echinacea is one of the most commonly used alternative medicines, representing 10% of the herbal market. There are nine species of the genus *Echinacea*, a member of the sunflower family, found in North America. The most common and widespread of these are *Echinacea angustifolia, E. purpurea and E. pallida,* each of which has a long history of medicinal use. The majority of pharmacologic studies since 1939 have been conducted one. *purpurea* preparations made from the fresh pressed juice of the flowering plant. Many chemical compounds have been identified from *Echinacea* species and it is currently not possible to attribute the pharmacological effects to any specific substance. Constituents that have been identified include volatile oil, caffeic acid derivatives, polysaccharides, polyines, polyenes, isobutylamides and flavonoids of the quercetin and kaempferol type. Many studies of echinacea have pointed to effects on the immune system.

Proposed mechanisms of action include increased circulating granulocytes, enhanced phagocytosis, inhibition of virus proliferation, cytokine activation, increased T-lymphocyte production and an increase in the CD4/CD8 T-cell ratio. Echinacea is currently most widely used in attempts to prevent the common cold and influenza symptoms, but is also used for *Candida* infections, chronic respiratory infections, prostatitis and rheumatoid arthritis. Well-controlled studies have shown little, if any, benefit. One recent placebo-controlled study of echinacea in the treatment of the common cold actually suggested echinacea did not prevent people catching a 'cold' and if they did get symptoms they lasted slightly longer in patients taking echinacea.

Adverse effects

Adverse effects of echinacea use involve rashes, including erythema multiforme, arthralgias, allergic reactions, gastrointestinal disturbances including dysgeusia, dyspepsia and diarrhoea.

Drug interactions

Some flavonoids present in echinacea extracts can either inhibit or activate human CYPs and drug transporters, depending on their structures, concentrations and assay conditions. **Midazolam**, a substrate for CYP3A4 and CYP3A5,was cleared 42% faster during an eight-day echinacea treatment in 12 volunteers and there was a 23% reduction in **midazolam** area under the curve (AUC). The oral bio availability of **midazolam** in this study was significantly increased from 24to 36% in the presence of echinacea, indicating that the hepatic and intestinal availabilities were altered in opposite directions. These data suggest that echinacea is likely to interact with other oral drugs that are substrates for CYP3A4 and that the interaction will depend on the relative extraction of drugsat the hepatic and intestinal sites and the route of administration.

Soy

The use of soy (Glycine max) and soy-derived products for the treatment of menopause in women is growing with the fear of SOY **99** possible side effects of traditional hormone replacement therapy. The principal constituents of soy, the is oflavones genistein and daidzein, are structurally similar to 17 α-oestradiol and produce weak oestrogenic effects (i.e. they are phytoestrogens). It is prudent to discourage soy-derived products inpatients with oestrogen-dependent tumours (e.g. breast cancer or endometrial cancer) because experimental data indicate that soy can stimulate the growth of these tumours in mice. Furthermore, as genistein can negate the inhibitory effect of **tamoxifen** on breast cancer growth, women taking this agent should especially avoid soy. Acute vasodilatation caused by 17 β-oestradiol is mediated by nitric oxide, and genistein (which is selective for the oestrogen receptor Erβ, as well as having quite distinct effects attributable to tyrosine kinase inhibition) is as potent as 17β-oestradiol in this regard, raising the possibility of beneficial vascular effects.

Adverse reactions

Adverse reactions in soy use include allergic reactions (pruritus, rash, and anaphylaxis) and gastro-intestinal disturbances(nausea, dyspepsia, diarrhoea).

Drug interactions

Isoflavones, such as genistein and daidzein, also inhibit oxidative and conjugative metabolism *in vitro* and *in vivo*. In 20 healthy volunteers, a 14-day course of soy extract (50 mg twice aday) did not alter the ratio of the amounts of 6β-hydroxycortisol and cortisol excreted in the urine, suggesting that soy is not an inducer of CYP3A4 in humans. However, genistein interacts with transporters such as P-glycoprotein (MDR-1, ABCB1), MRP1 (ABCC1) and MRP2 (ABCC2).

Given that these transporters are involved in the intestinal absorption and biliary secretion of many drugs, it is reasonable to suspect that soy may alter drug absorption and/or disposition of such agents in humans.

Saw Palmetto

Saw palmetto *(Serenoarepens)* is derived from a tree native to southeastern North America, particularly Florida. The main constituents of saw palmetto include carbohydrates, fixed oils, steroids, flavonoids, resin, tannin and volatile oil. Saw palmetto is used in men with the hope of 'toning and strengthening the reproductive system, and specifically for symptoms of prostate enlargement'. It has oestrogenic activity and reduces plasma testosterone concentration. In women, the principal use of saw palmetto is to (hopefully) reduce ovarian enlargement and to increase the size of small breasts. Although no drug interactions with, or medical contraindications to, the use of saw palmetto have been reported, it would be prudent to avoid concomitant use with other hormonal therapies, especially oestrogens, and in patients with oestrogen-dependent cancers.

Adverse effects

The adverse effects of saw palmetto involve gastro-intestinal intolerance, nausea and diarrhoea, hepatitis and cholestasis, gynaecomastia and impotence.

ST John's Wort

St John's wort *(Hypericum perforatum)*, a perennial plant native to Europe, North America and western Asia, is one of the most extensively studied herbal products and many of its uses are based on observations noted in early Greek and Roman medicine. Currently, St John's wort is still widely used for the treatment of mild to moderate depression and other nervous conditions. Reported cases and trials have shown varying results of therapy with St John's wort for depressive and mood disorders. A meta-analysis of trials in 1757 patients concluded that treatment of depression with St John's wort was comparable to standard, prescription antidepressants and superior to placebo. More recently, a randomized, double blind, placebo-controlled trial evaluating the safety and efficacy of St John's wort in the treatment of patients with major depressive disorders revealed that St John's wort was no more effective than placebo. St John's wort extract is a very complex mixture of over20 constituent compounds. These include catechin-type tannins and condensed-type proanthocyanidins, flavonoids (mostlyhyperoside, rutin, quercetin and kaempferol), bioflavonoids (e.g. biapigenin), phloroglutinol derivatives like hyperforin, phenolic acids, volatile oils and naphthodianthrones including hypericin and pseudohypericin. With regard to the putative antidepressant effects of St John's wort, the pharmacological activities of hypericin and hyperforin, which inhibit synaptic 5HT and catecholamine reuptake, could contribute.

Adverse effects

Adverse CNS effects include headaches, drowsiness, restlessness, serotonin syndrome, if used with SSRIs or TCAs, skin photosensitivity. Gastro-intestinal disturbances involve abdominal pain or discomfort, and xerostomia. Drug interactions with therapeutic failure of concomitant drugs, e.g. HIV protease inhibitors, **ciclosporin,** warfarin, **theophylline,** antidepressants, oral contraceptives and anti-canceragents, such as **irinotecan.**

Drug interactions

Many clinical trials are now reporting significant pharmacokinetic interactions with long-term treatment with St John's wort and drugs from a variety of therapeutic classes. These studies followed a number of case reports of serious interactions between St John's wort and

digoxin, theophylline, ciclosporin, oral contraceptives, **phenprocoumon, warfarin** and **sertraline,** thought to be secondary to enzyme induction. The mechanism for most of the interactions observed in subsequent clinical trials remains unclear, although for some agents, induction of CYP3A4 (e.g. **indinavir, midazolam, simvastatin**), P-glycoprotein-ABCB1 (e.g. **digoxin, fexofenadine**), or both (e.g. **ciclosporin**) may explain their increased clearance.

Glucosamine

Glucosamine is available as a non-prescription dietary supplement and in many products is obtained from shellfish. It is one of several naturally occurring 6-carbon amino sugars found in the body. Amino sugars are essential building blocks formucopolysaccharides, mucoproteins and mucolipids. Some commercial products contain glucosamine in combination with chondroitin. The precise mechanism of action of glucosamine is unknown. *In vitro* data suggest glucosamine canstimulate cartilage cells to synthesize glycosaminoglycans and proteoglycans. It is more likely that the cell produces smaller, soluble subunits; assembly of these smaller, soluble subunits outside of the cell into a soluble form of collagen has been proposed. Solubilized collagen, or tropocollagen, is a precursor of mature collagen fibres. Chondroitin inhibits the enzymes that degrade cartilage. Several clinical studies have documented the efficacy of glucosamine in the treatment of patients with osteoarthritis: data from double-blind studies showed glucosamine was superior to placebo and to ibuprofen in patients with osteoarthritis of the knee. Although there is a scientific basis for administering glucosamine in combination with chrondroitin, there is currently no evidence that the combination is more effective than glucosa-mine alone for osteoarthritis. A randomized, placebocontrolled, double-blind study evaluated the effects of glucosamine on disease progression and supported the use of glucosamine long term (three years) for slowing progression of knee osteoarthritis.

Adverse effects

The adverse effects associated with glucosamine involve gastro-intestinal disturbances, including dyspepsia, nausea, constipation and diarrhoea, skin rashes and allergic reactions in patients with known shellfish allergy.

Drug interactions

No drug interactions have been defined with the use of glucosamine.

Miscellaneous Herbs

Warnings about the toxicity of herbal products such askava kava (hepatotoxicity), aristocholic acid (nephrotoxicity) and phenphen (pulmonary hypertension) have recently been communicated to prescribers and the public. PC-SPES, which was used by many prostate cancer patients because of anecdotal and uncontrolled studies of evidence of activity in prostate cancer, was withdrawn from sale, by its suppliers after the FDA found it contained alprazolam and phytoestrogens.

Conclusion

Herbal and nutraceutical products are widely available over the counter in many shops and are not regulated. The efficacy of such products in many cases is not supported by rigorous clinical trials. Patients believe herbals are safe and are unaware of documented or potential toxicities. Many patients take herbal products in conjunction with prescription medications, unknowingly risking herb-drug interactions. When a patient develops an unusual reaction to

his or her drug therapy (either therapeutic failure or toxicity)a careful history concerning the use of herbal products should be obtained.

References

Reddy DG, Gopala Reddy A, Rao, GS and Vijay kumar M., (2012), Pharmacokinetic interaction of garlic and atorvastatin in dyslipidemic rats. *Indian J. Pharmacol.* **44**(2): 246-252.

Ernst E., (2002)., A systematic review of systematic reviews of homeopathy. Br. *J. Clin. Pharmacol*; **54**(6): 577-82.

Hyun-Jong Cho and In-Soo Yoon., (2015), Pharmacokinetic Interactions of Herbs with Cytochrome P450 and P-Glycoprotein. *Evid. Based Complement. Alternat. Med.* doi:10.1155/2015/736431.

Ken-ichiFujitha, (2004), Food-drug interactions via human cytochrome P450 3A (CYP3A). *Drug MetabPersTher*, **20**(4): 195-205.

James R, Lionel L, Timothy M and Albert F., (2008), Alternative medicines: herbals and nutraceuticals. In: A textbook of clinical pharmacotherapeutics. 5thEdn., Companion Web, London, pp:97-101.

Borrelli F andIzzo AA., (2009), Herb–Drug Interactions with St John's Wort *(Hypericumperforatum)*: an Update on Clinical Observations. *The AAPS Journal.* **11**(4):710. doi:10.1208/s12248-009-9146-8.

Ju YH, Doerge DR, Allred KF, Allred CD and Helferich WG., (2002), Dietary genistein negates the inhibitory effect of tamoxifen on growth of estrogen-dependent human breast cancer (MCF-7) cells implanted in athymic mice. *Cancer Research.* **62**(9):2474-7.

Stieger B, Mahdi ZM andJäger W., (2017), Intestinal and hepatocellular transporters: Therapeutic effects and drug interactions of herbal supplements. *Annu. Rev. Pharmacol. Toxicol.* **57**:399-416.

Metabolic and Mineral deficiency diseases of animals

Selenium deficiency

Selenium exerts its action in combination with Vitamin E. Deficiency symptoms of selenium include nutritional muscular dystrophy (white muscle disease) in all species, retained placenta in cattle, Mulberry heart disease, anemia and hepatosis dietetica in pigs and bone abnormalities in pigs.

Treatment:

For muscular dystrophy in calves, lambs, foals give 3 mg of selenium as sodium selenite or potassium selenite intra-muscularly and 150 IU/ml of DL-alpha-tocopherol acetate @ 2 ml/45 kg body weight.

Your problems ?

Expert's solutions

An expert

Veterinary Microbiology

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Dr. A. R. Deshpande is senior professor at COVAS, Parbhani and has 28 years of professional experience. Dr. Deshpande did his Doctoral research work at the institute and has guided 15 post graduate students for master's research. He has handled many research projects on microbiological investigations and has helped field veterinarians in diagnosis of infectious diseases through his laboratory investigative support. Dr. Deshpande has 16 research publications to his credit and has also published technical publications. He has presented research investigation through 20 national and international conferences.

1) Are small ruminants more immune to diseases than large ruminants?

Answer: Yes. Small ruminants, particularly goats being totally local and almost very less hybrids are available, they have less stress of production as compared to large ruminants, are more immune than others. Stress is an important factor in immune response which may lead to vaccination failure as expected immunity may not be produced in stressed animals. Goats being genetically local and well adopted animals are stronger in producing immune response .Further, the goats raised of grazing eat various shrubs in the adjoining areas might be consuming the leaves of some plants and shrubs

which may be immunostimulator in action. Also some shrubs are having anthelmintic activity due to which continuous process of deworming may be carried in a natural way. All these factors make a goat more immune than the large ruminants.

2) What are the causes of sudden death in goats?

Answer: The term "sudden death" is used to describe deaths that occur within 24 hours of signs of sickness occurring. The various causes of sudden death are related with bacteria, parasites and poisons. Anthrax is a rare cause of death of in goats but more common in endemic areas. Anthrax should be suspected in animals that die suddenly and show a blood discharge from the mouth, nose or anus. The Clostridial diseases are a major cause of sudden death in goats, particularly enterotoxaemia. Goats can die suddenly of acute liver fluke disease in the late summer and post-mortem shows extensive liver damage. Large numbers of Haemonchus contortus (Barber's pole worm) in the fourth stomach will cause sudden deaths. This worm sucks blood and causes a fatal anaemia which, in goats observed before death, may cause pale mucous membranes and a collection of fluid swelling under the lower jaw. The small brown stomach worm (Ostertagia species), the small stomach worm (Trichostrongylus axes) and hair worms of the small intestine (Cooperia species and Trichostrongylus species) can cause sudden death if numbers are large enough. Similarly, Accidental contact with open electric live wires may result in sudden death. Poisonous snake bites may lead to sudden death.

3) Does metabolic disorders are fatal in goats?

Answer: The "transport tetany" and "capture myopathy" cause sudden deaths in goats. The stress of capture and transport, changes in the routine of feeding and watering and change in climate will quickly cause any concurrent disease to become important. Goats that have travelled may die of induced enterotoxaemia, pregnancy toxaemia and transit tetany. "Capture myopathy" is a muscular degeneration in goats. It is not fatal immediately; it causes death by kidney malfunction later in life. To reduce these losses, goats should be vaccinated with Clostridial vaccine and drenched for parasites two weeks before transport. Dietary changes should be as gradual as possible and stress in transport reduced.

4) Poisoning cases are more in due to browsing habits, please comment

Answer: Most acute poisonings of goats are due to toxic plants and insecticides. Ingestion of extremely toxic plants cause gastro-enteritis, paralysis and death after heart failure. Deaths in goats from insecticides occur when these compounds are not used according to the manufacturers' recommendations, and particularly when they are used excessively. Poisoning may occur when insecticide is accidentally swallowed. Usually there are nervous signs, such as over-excitement, muscular jerking and an inability to stand or walk properly. Salivation is common and urine and faeces are passed more frequently. There are signs of abdominal pain. Eventually the goat goes into convulsions and dies. Rat poison may be eaten by goats because it is often incorporated with grain. If large quantities are consumed death can be rapid. Where poisoning is suspected, veterinary assistance should be sought immediately. There are specific antidotes for most insecticides. Great care should be taken with any poisonous substance. Since many are attractive to goats, uncontrolled access to them should not be allowed.

5) Why goats suffer bloat problem more under traditional system of rearing?

Answer: Bloat occurs when goats consume large amounts of lush green leguminous feed such as Lucerne and bloat can also occur on Lucerne hay. In bloat, the food mixture in the rumen or the first stomach forms foam that the goat cannot belch away. As a result, the gases formed by digestion build up. The rumen quickly fills with gas and the animal becomes distressed

as pressure from the distended rumen increases. The abdomen is very swollen, and this swelling appears on the animal's left side. Death can occur quickly from failure of respiration and heart action as a result of pressure on the diaphragm. If the goat is standing and there are no suitable stock medicines available it can be drenched with 60-120cc of either peanut, maize or safflower cooking oil. Oil will break up the foam and allow the gas to escape. After drenching, it may be necessary to massage the rumen or roll the goat over to spread the oil about among the contents inside the rumen. If the goat is down, death may be close and quick action is usually needed. The goat should be stabbed with a clean sharp instrument or knife in the left flank behind the ribs so as to pass into the rumen. Allow the gas to escape fairly slowly, rather than in one or two seconds as this in itself may be fatal. This is a life-saving procedure and any resulting infection can be attended to later by a veterinarian. Oil that is used for drenching affected goats can then be poured or squirted into the rumen via the wound created to release the gas. There are commercially manufactured stock medicines in the market for bloat treatment, which are superior in action to household cooking oils; where bloat in goats is likely, owners should have these stock medicines on hand in the event of an emergency. Where goats are grazing on lush legumes, access to roughage in the form of hay or dry pasture should always be provided. The rule is to increase grazing time gradually, and watch for swelling of the abdomen, particularly during periods of lush pasture growth or when a change in the routine of the herd may cause a variation from the usual pattern of intake of food and water. The time spent grazing legumes must be strictly controlled.

6) What is star grazing in goats?

Answer: Cerebrocortical necrosis (C.C.N.) is a disease also known as Polio-encephalo-malacia (PEM.) or "Stargazing". Vitamin B, (thiamine) is essential in goats to allow glucose to move via the blood to the brain. If thiamine is lacking in the diet or destroyed by substances in certain plants (such as bracken fern and nardoo fern) signs of C.C.N. can appear. Goats "stargaze", twitch muscles, then go into convulsions and die. Early in the course of the disease animals may appear blind, wander aimlessly or stand motionless. Thiamine given at this stage will often affect a complete recovery.

7) What are different causes of abortions in goats?

Answer: Goat herds generally have a 2 to 5 per cent abortion rate. Any percentage above this is a serious problem because abortions can lead to economic losses. The most common microorganisms that cause abortions in goats are Chlamydiosis (*Chlamydia psittaci*), Query or Queensland (Q) fever (*Coxiella burnetii*), Listeriosis (*Listeria monocytogenes*), Leptospirosis (*Leptospira spp*), Toxoplasmosis (*Toxoplasma gondii*), Brucellosis (*Brucella melitensis*) and Chlamydiosis (*Chlamydia*, Enzootic Abortion). Chlamydiosis, commonly known as chlamydia, is the most frequent cause of abortion in goats in . It is associated with pneumonia, pink eye, inflammation of epididymis (a part of the buck's reproductive system), and inflammation of the joints. It can be transmitted to does through the direct contact of feces from infected pigeons and sparrows. Chlamydia can be also transmitted to goats by ticks or other blood sucking insects. Abortions can occur any time between days 100 and 130 of gestation.

Listeriosis is caused by the bacteria *Listeria monocytogenes* (Lm), which can be found in soil, contaminated water, and spoiled, concentrated hay or silage. It can live in soil and fecal contents for a long time. Infected does show neurological disturbance due to encephalitis (inflammation of the brain). Abortion can occur at early stages of pregnancy and infected does can produce stillborn or weak kids. Leptospirosis can cause abortion, stillbirths, or the birth of premature or weak, infected kids. The most common serovars, a subdivision of a species different from other strains, causing abortions in goats are *Leptospira*

interrogans, grippotyphosa, and *pomona*. Goats are susceptible to these strains, with abortion occurring after infection at the time when the microorganisms start to multiply in the doe's blood. Some have shown anemia and jaundice (yellowing of the tissues, usually resulting from abnormal liver function) and hemoglobinemia (part of red blood cells that carries oxygen). However, an infected doe may not have fever or jaundice. Toxoplasmosis is caused by the *Toxoplasma gondii* microorganism. It is another common cause of infectious abortion in goats, other animals, and humans. Cats can be carriers of *T. gondii*. Cats often defecate and bury their feces in the hay and food storage areas of barns. Does can become infected by ingesting food or water contaminated by feces. Goats can be infected by *Brucella melitensis* (a specific strain that causes disease in goats) or *Brucella abortus* (a specific strain that causes disease in cattle) by ingesting Brucella from contaminated feed, pasture, or water. Brucella can be found in milk, urine, feces, placenta, and vaginal secretions that accompany natural birth or abortion. In the case of normal full-term births, kids from infected does are often infected and capable of spreading the disease.

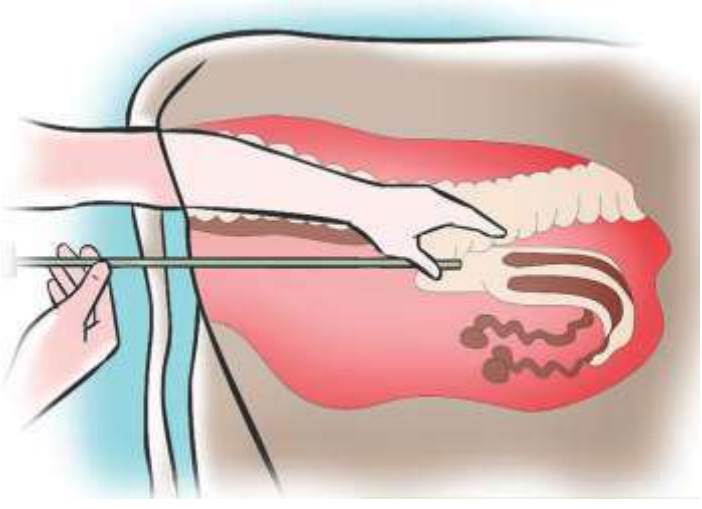
8) What to do when abortion occurs?

Answer: Never ignore abortions in a goat herd. Conduct a thorough investigation immediately. Isolate the animal from the herd and keep it in a quarantine pen for further examination. Consider many different causes of abortion. Inform your veterinarian if you suspect infectious abortion in a goat herd; the veterinarian will refer you to a nearby diagnostic center. Consult the diagnostic laboratory prior to submitting your sample. The diagnostic center should be aware of the infectious agent most likely to be present in the area. Note: Diseased tissue requires proper handling. To facilitate the diagnosis, keep detailed records and accurately identify each aborting animal and the stage of pregnancy at which the animal aborted. Refrigerate (avoid freezing) any fetus and placenta of an aborted kid to send to the diagnostic laboratory. Work with the local veterinarian to draw blood and to send serum samples from aborting does to the diagnostic laboratory for immunological tests. Consult your local veterinarian when you suspect infectious abortion in your herd. This might constitute a public health issue. Your veterinarian can guide you on the treatment and prevention procedure. Ask for performance and health records before purchasing new animals. Quarantine any new animals before introducing them into your existing herd. Be aware that certain classes of dewormer administered to pregnant do can cause insidious abortion or stillbirths, which can be mistaken as abortions caused by infectious agents. Be aware that certain poisonous plants can cause abortions in does. Identify plants in your area that can cause abortion and try to eliminate them from the pasture. People who assist at kidding or collect placental or fetal waste for disposal or diagnostic evaluations should be aware of the danger of infection and are advised to wear plastic gloves. The gloves should be burned to prevent environment contamination. Quaternary ammonium compounds are satisfactory disinfectants. Abortion incidence is more in goats because breeding is invariably by natural service hence once male of a flock is affeted by a disese, the females also will be affected and the disease will spread in the entire flock.

9) Which are the most important bio security measures for a goat farm?

Answer: Consult a veterinarian when implementing vaccination and other herd or flock health management strategies. Limit the number of people who enter the premises, and know all people who come and go, including consultants, salesmen, deliverymen, maintenance workers and veterinarians. Remove mud and manure by scraping or scrubbing both the interior and exterior of the trailer, truck and equipment. Soak and wash vehicles and equipment. Keeping the premises clean and hygienic is the key to success in achieving microbe free status in sheep and goat farms.

Ministry of Agriculture sets target of AI for the current year



To achieve national goal of 300 million ton milk production by 2023-24, Ministry of Agriculture sets target of 100 million Artificial Insemination in dairy animals for the current year 2017-18. State wise targets have been given to various state Department of Animal Husbandry, Dairying and Fisheries (DADF) in this regard. Government's ambitious goal of doubling farmers income by 2020 is possible through animal husbandry sector as AI can provide leap in animal productivity

Key strategy for increasing productivity is through ensuring Artificial Insemination (A.I.). A.I plays a vital role in improving the productivity of Bovines by upgrading their genetic potential thereby enhancing the milk production and productivity in the country. This core activity is fortified through the ongoing flag ship schemes, National Programme for Bovine Breeding (NPBB) and Indigenous Breeds (IB) under the Umbrella scheme Rashtriya Gokul Mission (RGM). These programmes envisage twin benefits namely (i) To improve the productivity and enhance milk production and (ii) To increase farmers income that will facilitate the Government's ambitious goal of doubling their income by 2020.

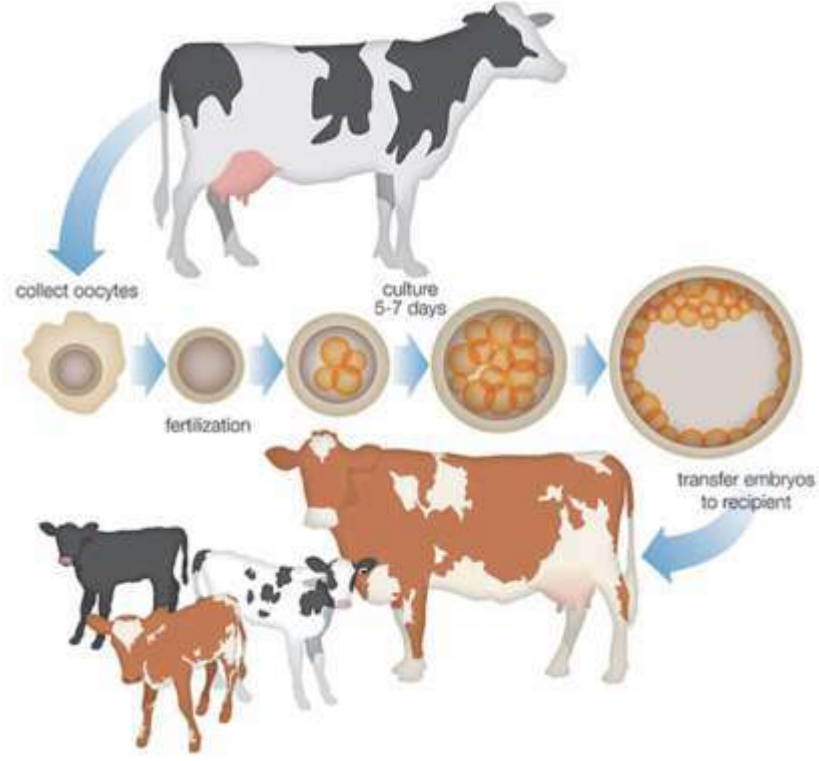
The A.I. coverage is still 26 per cent of the breedable population. As per 2015-16 data made available by the States, an Artificial Insemination worker merely performs 1.92 A.I per day as against the required average of atleast 4 A.I. per day. Further, 3 semen doses are used for achieving one successful conception. Thus there is wastage of high quality semen due to usage of 3 semen doses for each successful A.I. This poor situation is further aggravated by usage of Indigenous bull semen being merely 1 per cent of total A.I coverage.

Mission embryo transfer for promising revolution

Department of Animal husbandry, Dairying and Fisheries in co-operation with 12 States has undertaken a Mass Embryo Transfer programme in Indigenous Breeds under the scheme, National Mission on Bovine Productivity. The programme was implemented with the objective of conservation and development of indigenous breeds under Rashtriya Gokul Mission.

Through the use of ETT, a farmer is expected to get a 5-6 fold increase in number of offsprings , the calves so born will be of high genetic merit and the offsprings born will be free from diseases. Under this programme, embryos of higher genetic merit indigenous bovines were transferred in to surrogate cows.

Embryos of Indigenous breeds such as Sahiwal, Gir, Red Sindhi, Ongole, Deoni and Vechur have been proposed to be transferred under this programme. On first day of ET programme held on 2nd October, 35 embryos were transferred in to recipients. The technology now being taken up to the doorstep of the farmers will result in rapid propogation of high genetic merit indigenous cattle.



Know the prestigious Institute

ICAR-Central Institute for Research on Goats

ISO 9001:2008 Certified Institution

Keeping in view, the importance of goats in the Indian economy and more so for the below poverty line population, the Indian Council of Agricultural Research established a National Goat Research Centre in July, 1976 at Makhdoom village near Farah town of Mathura district in Uttar Pradesh. It got the status of a full-fledged Institute on **12th July,1979** and named as the **Central Institute for Research on Goats** with the mandate to conduct both applied and fundamental research on all aspects of goat production and product utilization.

Vision

To "Develop Poor Man's Cow- the goat as a source of livelihood security, poverty alleviation and employment generation for smallholders.

Mission

To enhance and sustain goat productivity in respect of meat, milk and fiber through Research, Extension and HRD support.

Mandate

To undertake Research, Training and Extension Education Programmes for improving milk, meat and fiber production of goats and to develop processing technologies of goat products.

Quality Policy:

Institute has been awarded with ISO 9001:2008 Certification during 2014-15.

CIRG is committed to enhance goat productivity through research, extension and HRD support for the benefit of society, industry and scientific community.

Towards this, we shall,

- Continue to align our actions with organizational values

- Implement QMS as platform for improving performance standard
- Continually improve our performance by periodical review of quality objectives and RFD documents
- Actively involve and adequately empower all personnel

Infrastructure and facilities

The institute consists of various research divisions and sections, viz

Animal Genetics & Breeding, Animal Nutrition & Products Technology, Animal Physiology & Reproduction, Animal Health, Extension Edu. & Socio-Economic Section, PME Section, IPR & ITMU Section and AKMU Section.

The Institute has 755 acres of land consisting of buildings, roads, residential complexes, Animal Sheds, Agro forestry land and Natural Pasture area with cultivated land and Silvi-pasture units.

Institute is having linkages and collaborations with National Universities for M.V.Sc., M.Sc., and Ph.D. programmes. Institute library is providing scientific and related information based on primary documents and bibliographic data. It has built up a good collection of sizable number of books, journals, periodicals, reprints etc. to cater the need of scientific community.

The Institute has a Agriculture Knowledge Management Unit (AKMU) which maintains the institute website is: http://www.cirg.res.in as well as e mail server. This section provides computer related support is provided to the Institute scientists, students and administrative staff for their research work and administration and purchase etc.

The Institute is maintaining about 3000 goats and sheep under different Projects in the following Animal Farms:

Barbari Goat

Jamunapari Goat

Salient Research Contributions

The institute has developed farmers' friendly and commercially viable technologies for goat improvement in the country. So far, 18 patents have been filed; Eight technologies have been transferred to different industries for large scale production of different products. Value added goat meat and milk products, diagnostics for brucellosis and JD are under process of commercialization. The scientists of the Institute have successfully produced kids from embryo transfer and through IVF. In recognition of its meritorious scientific achievements and technology innovation.

Salient achievements :

- Developed and validated 24 transferable technologies for improving goat production in different agro-climatic regions.
- Conserved and maintained three important goats breed i.e. Barbari, Jamunapari and Jhakharana in the Institute.
- Selective breeding improved reproductive performance in higher population growth in Jamunapari (94.65%) and Barbari (183%) goat flock maintained at CIRG. Improved body weight of Jamunapari (45.67%) and Barbari (31.96%) goats at 12 month age.
- Standardized Artificial Insemination protocol in goats with success rate of 52%.
- Standardized Embryo Transfer and IVF technology in goats and successfully produced kids.
- Standardized rearing space requirement, housing design and developed feeder and waterer for optimum production performance.
- Developed complete feed pellet for efficient growth for intensive goat .
- Developed agroforestry models for sustainable goat husbandry in semi-arid , rain fed and ravine areas,
- Developed dynamic health calendar for goat farmers comprised of vaccination, deworming and regular screening schedule for different climatic zones .
- Developed indigenous diagnostic kits for Johne's disease and brucellosis in goats.
- Developed herbal formulation as antidiarrheal, skin antiseptic gel, ectoparasiticidal , anthelmintic and anti-stressor in goat , which are more suitable for organic goat farming.
- Standardized process for preparation of value added goat meat and milk products such as Goat meat nuggets,Goat Meat Pickle, Goat meat Sausage, Goat meat Patties, Meat Shami Kebab, Herbal Goat meat nuggets, Meat Nimkee/Murruku, Meat/ Milk Biscuits , goat milk soap and Goat Milk Pops
- AICRP on goat improvement through its eighteen centres in country carried out for genetic improvement of Barbari, Black Bengal, Ganjam, Jamunapari, Marwari, Malabari, Sirohi, Sangamneri, Black Bengal, Uttrakhand Local, Himalayan Local, Osmanabadi, Gaddi, Changthangi, Assam Hill, Marwari, Andman local, and Surti breeds in their natural habitat and serving as nodal point for technology dissemination and enhancing skill of farmers .
- Developed online Goat Production Management Information System (GMIS) for an efficient and effective data recording, data analysis, monitoring & evaluation. This has been adopted for other animal species by the ICAR.
- Developed capacity building and skill development centre for scientific and economic goat farming.

Thrust Areas And Strategies

1. Genetic improvement & conservation of elite germplasm of indigenous breeds of goats, cutting edge and frontier technologies to improve goat productivity

- Establishment of seed stock production centers for important breeds of goats in their breeding tracts.
- Multiplication and conservation of superior germplasm employing reproductive biotechniques.
- Quality semen production and cryo preservation.

Technologies commercialized

Name of institute	Name of the technology developed	Details of the technology	Approximate users	Impact , if any
ICAR–CIRG	Herbal antidiarrheal powder for animals	This product is a combination of three plant extract/powder for the effective control of bacterial diarrhoea/nonspecific diarrhoea in animals	Marketed in all part of India for livestock treatment. Technology used by the veterinarian for treatment of diarrhea 	Reduce the dependence of antibiotic in therapy of diarrhea in animals .
ICAR–CIRG	Herbal Skin antiseptic Gel for animals	This product is a combination of two plants extract in ointment base/gel for the effective control of septic & maggot wounds in animal.	Marketed in all part of India for animal treatment. Technology used by the veterinarian and animal farmers for septic & maggot wounds in cow, goat, sheep and buffalo. 	Reduce the antibiotic /antibacterial in skin ailments in animals.
ICAR–CIRG	1.AJAS- Goat milk based beauty soap Three variants of Goat milk based beauty soap A. AJAS- Beauty Soap, B. AJAS- Green soap , C. AJAS- Antiseptic soap	Goat milk base soap was prepared by adding a definite concentration of processed goat milk, goat fat, mixture of oils and herbal extract for healthy skin. Soap base was prepared by mixing oils of Coconut oil, Linseed oil, Castor oil, sunflower oil and Almond oil in a ratio and processed goat milk was used .In soap mixture herbal gel /extract was added by 3% for enhancing efficacy as antiseptic . No petroleum jelly was used.	Has potential for human use country wide 	Accepted by 80% under efficacy study
ICAR–CIRG	JD Vaccine	This killed vaccine is developed by using native strain of Mycobacterium avium subspecies paratuberculosis for the animals. This killed JD vaccine providing protection against Mycobacterium avium subspecies paratuberculosis in animals and also beneficial in clinical animal used as therapeutic vaccine.	All parts of country 	-

- Stem cell research for reproductive efficacy.
- Molecular basis of adaptation and functional genomics
- Marker assisted selection (MAS) for disease resistance, production and fertility enhancement in view of the impending climatic change
- National Breeding Policy on goats to further strengthen breed improvement programme.
- Automation in management systems for improving goat farm management practices.
- Shelter management practices, development and standardization of modern shelters and appliances in view of climate change.

2. Development of newer generation diagnostics, vaccines and alternative therapies for important diseases of goats

- Recombinant based diagnostics against Brucellosis, JD.
- Development of DIVA and sensitive Pen side Test for goat diseases.
- Disease surveillance, monitoring and forecasting system on major goat diseases including zoonosis.
- Developing alternative therapies using ethno-veterinary and regenerative medicines for treatment of goat diseases and disorders.

3. Nutritional strategies to improve nutrient utilization, feed and fodder availability

- Strategic supplementation for better feed conversion, nutrient utilization and rumen microbial manipulation.
- Evaluation of properties of indigenous herbs and approaches to optimize nutrient utilization, methane mitigation and to improve animal productivity under different agro-climatic conditions.
- Developing feed and fodder production and pasture system for eco-friendly goat production under changing climatic conditions.

4. Value addition of goat milk and meat products and quality control

- Evaluation of medicinal properties of goat milk and its promotion as neutraceutical.
- Development of designer and nutrient fortified goat milk and meat products.
- Research on processing technologies, value addition, quality assurance (detecting adulterants and contaminants) packaging, storage and marketing.
- Promotion of public-private partnership, management of intellectual property and effective transfer of technology of value added goat meat and milk products.

5. Human resource and entrepreneurial development through trainings, consultancy and ICT support

- Development of human resource to tackle specific problems in goat production and health.
- Capacity building of different stakeholders for promotion and adoption of goat enterprise.
- ICT mediated extension approaches to strengthen linkages with large number of farmers to assist transfer of technologies and address goat farmers' problems.

Pioneer's Profile

Prof. Dr. Suresh S. Honnappagol
Animal Husbandry Commissioner
Room No 234, DAHDF, MoA& FW, GoI,
B Wing, KrishiBhawan, NEW DELHI – 110 001

Credentials as a Professional Leader

Prof. Suresh.S. Honnappagol, born in 1959 in ChikkaAsangi (VijaypurDist), obtained his B.V. Sc (1982), and M.V.Sc (1985), from UAS, Bangalore and his PhD (1992) from Indian Veterinary Research Institute, Bareilly, U.P.

He started his academic carrier as Instructor (1985) at Veterinary Collage, Bidar and rose to the positions such as Assistant Professor (1992), Professor (1996), Director of instructions (1999) and Dean (2004) in the same institute within a span of 20 years. After establishment of Veterinary Varsity in Karnataka, he served as Founder Registrar (2004), Director of Research (2007) and Second Vice Chancellor (2008-2012) of KVAFSU, Bidar. After demitting his office as Vice Chancellor he served as Officer on Special Duty, Head Of Division and Professor & Head of Animal Reproduction at Veterinary College, Bangalore.

Later he joined the ICAR as Assistant Director General for Quality Assurance & Reforms at Education Division during May to December 2013 and contributed towards excellence in higher agricultural education.

Currently he is holding the position of profession's most coveted position as Animal Husbandry Commissioner, Ministry of Agriculture & Farmers Welfare, Gov of India, New Delhi since December, 2013. In total he has put in 33 years of his active service in various academic and administrative positions.

Prof. Honnappagol has immensely contributed to the all-round growth of veterinary profession in the country. He served more than 20 years of his service in education, research and extension management positions. As a Vice Chancellor he has contributed towards establishment of new colleges, research

centers, academic programmes (Table below) & entered MOU with many reputed National & International Institutes. Introduction of video conferencing facility, establishment of experiential learning units, modernization of farms, provision for overseas externship exposure to undergraduate students etc. were his footprints in the University. As a Founder Registrar of KVAFSU, Bidar, he was responsible for establishment of Academic, Administrative and Estate wings of the newly established University apart from streamlining the routine management and administrative activities.

	Particulars	Number	Impact
	New Initiatives of Prof. Suresh S Honnappagol as an academic leader		
1	Started new colleges in Karnataka	05 Veterinary 01 Dairy Science 02 Animal Husbandry Polytechnics	Increased Human resource availability for the livestock sector
2	Establishment of new research and information centers	01 Canine Research & Center Information 01 Fisheries & Center Information 01 Wildlife Veterinary Research Institute 01 Buffalo Research & Center Information	Enhanced capability of NARS network to meet regional and species specific research needs
3	New Courses	PG in Wildlife, MBA in Food Business, Diploma in Animal Husbandry	Enhanced professional development opportunities in various specializations
4	International Student- Exchange	With University of Minnesota, USA	Hands on training in Molecular Research

As ADG (EQR) he has coordinated the development of Minimum Standards of Higher Agricultural Education, Experiential Learning Modules, Model qualifications for VCs and Finalization modalities of NAEP.

As Animal Husbandry Commissioner responsible for technical matters related to Animal health, Production and human resource development designed the flagship programmes of Government of India like Rashtriya Gokul Mission, NDP-II etc.

Prof. Suresh S Honnappagol has been widely honoured for his meritorious research / development contributions and leadership in Science (Veterinary). He is the recipient of four national level Fellowships and more than 25 other awards of national and international repute. He is the recipient of Best Undergraduate Teacher (1988), Young Scientist (1989), Best Veterinarian Award (1996), Dr. R. D. Nanjaiah Memorial-KVA Life Time Achievement Award (2011), Karuna Award (2011), MatsyaRatna Award (2012) and Indira Gandhi Sadhbavana Award (2012) etc,.

Guidelines To Contributors

The contributions to the journal are accepted in the form of review articles, research articles (clinical / field studies), case reports, other information pertaining to animal health and production. The decision of the Editorial Board members will be final regarding acceptance of the article for publication. The manuscript should be typed on one side of the paper with double spacing except for footnotes and references for which single spacing be used. The style of reference citing should be followed as shown below.

The manuscript should be arranged in the following order:

Title:

Name/s of author/s:

Place of work :

Abstract :

Key words :

Introduction :

Material and Methods : (In details)

Results and Discussions :

Summary / Conclusions :

Acknowledgment : (If necessary)

References :

Periodical/s : Surname/s and initial/s of author/s, year of publication in parenthesis, title, abbreviated name of journal (italics), volume number, (Bold), Issue number first and last page number/s.

Books : Name/s of author/s., year of publication in parenthesis, title of the book, edition (Bold), name of publishers (Italics) and place.

Tables and Figures: Tables are to be numbered in Roman numbers (1 II and so on). Each table should have a clear title. Figures should be of good quality and numbered in Arabic numbers (1,2,3 and so on).

Clinical articles and short communications: Not exceeding 3 to 4 typed pages. In case reports, history, observation, tentative and confirmatory diagnosis, line of treatment and follow up on the case should be given. Trade names of drugs should be given in the Material & Methods and their details like composition, manufacturer etc. as a footnote.

We would appreciate if you kindly send us your manuscript (technical article) in Word File through e-mail.

Authors are requested to confirm that the paper has not been published elsewhere and also to indicate details of postal address for communication with STD code, telephone/fax number, mobile & email.

All manuscripts should be mailed to the following address:

E-mail : bluecrossbook@merck.com

"The Blue Cross Book",
MSD Animal Health,
Intervet India Pvt. Ltd.
Intervet House, 33, Pune-Nagar Road, (Behind Eden Gardens), Pune - 411014, India
Tel. (Direct): +91-20 66294723. Fax: +91-20-66050403,
Mobile : 09890623470.

ANNEXURE

MSD
Animal Health

The Science of Healthier Animals™

For more information,
Please visit www.msd-animal-health.co.in

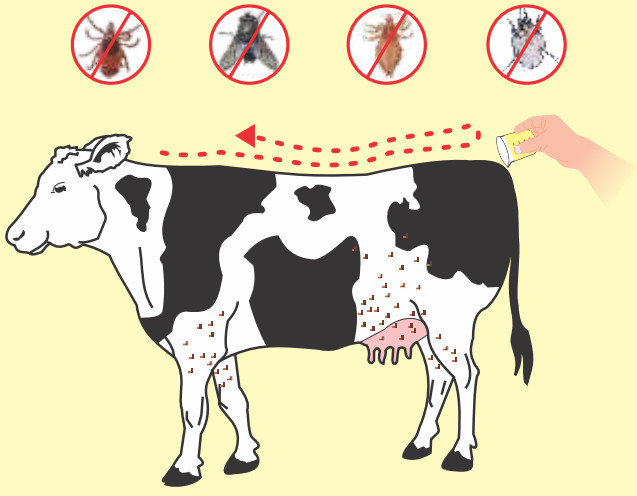
NEW INTRODUCTION

Introducing

OUT LINE™

POUR ON

The most Powerful Pour on Ectoparasiticide with Triple action



Safe in pregnancy

Withdrawal period :
Milk : 2 days
Meat : 20 days

Measuring cup

Hand glove

YELINTRA*™

Faster cure for mastitis

Withdrawal period :
Meat & Offal : 14 days
Milk : 96 hours (8 milkings)

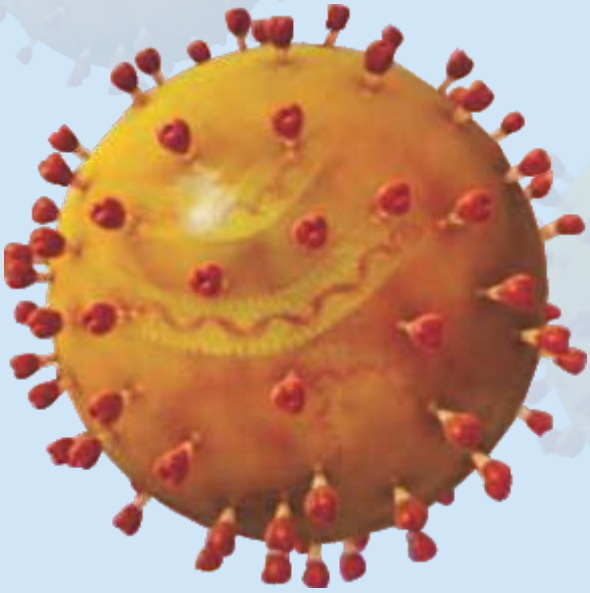
Most trusted by Farmers and Practitioners Across the Globe

*TM under registration

NEW INTRODUCTION

Nobilis® IB Ma5

An Early start on protection for a more profitable business



Nobilis® IB Ma5 : The Power of 5

1. Early immunity and early peak titer level
2. No interference with maternal antibody level
3. Superior technology - Plaque purified technology
4. Safe vaccine as it cause minimal respiratory reaction and safe to give at early chick stage
5. Nobilis® Ma5 and ND Clone 30 gives combine protection against IB and ND

MSD
Animal Health

NEW INTRODUCTION

FARMQUAT®

Disinfectant for Breeder, Broiler and Layer Premises and Equipments

- 5th generation quaternary ammonium compound for use in presence of bird.
- Ability to work at high pH level.
- Highly effective in hard water condition.
- Non corrosive and prevents deposition of metal salts on equipment .

FARMPHENE®

Strong terminal disinfectant for empty shed

- Strong antimicrobial and antifungal action in presence of heavy organic matter load.
- Ability to kill most resistant form of spores.
- Combination of natural and synthetic phenol along with cresylic compounds.
- Ability to work in 1000 ppm water hardness level.

RECENT INTRODUCTION

Introduces...

The Best Weapon to Improve Fertility –

VM^{all}™ Chelated

Promotes Health Improves Fertility

1st time in India with 6 Chelated Minerals

Zn Cu Co Se Fe Mn

- Improvement of Fertility
- Optimum Milk Yield and Fat

VM^{all} Chelated helps in:

- Better Growth
- Maintaining the Health of Livestock

Available in 1 kg & 5 kg

Nutritional Value per Kg:

Vit A	20,00,000 IU
Vit D_3	2,00,000 IU
Vit E 50%	3,000 IU
Vit B_3 (Niacin)	1,000 mg
Calcium	230 g
Phosphorus	115 g
Zinc	9,600 mg
Magnesium	6,000 mg
Copper	4,500 mg
Manganese	3,900 mg
Iron	1,500 mg
Iodine	500 mg
Cobalt	200 mg
Selenium	20 mg

Direction for use

- After calving : from day 5 to day 60
- Feed VM^{all} Chelated 25g to 50g/day/cow
- Or mix 100g VM^{all} Chelated per 10kg feed

MSD Animal Health

RECENT INTRODUCTION

Global Leading Brand in Dry Cow Therapy

Cepravin®

Dry cow mastitis protection

Broad Spectrum — Action against all major mastitogens includes *Staphylococcus aureus* , *E.coli*, *Streptococcus uberis* , *Streptococcus dysgalactiae*

Long Acting for +/- 60 days — Cepravin' s long acting formula treats the existing infection and prevents new infection throughout the dry period

- Significantly lowers somatic cell count into following lactation
- The Ideal choice for dry cow therapy

Composition:

Each syringe contains 250 mg Cefalonium dihydrate as active ingredient

Indication:

For routine dry cow therapy to treat existing sub-clinical infections

Prevent new infections during dry period

Dosage:

One syringe should be infused into the teat canal of each quarter immediately after the last milking of lactation

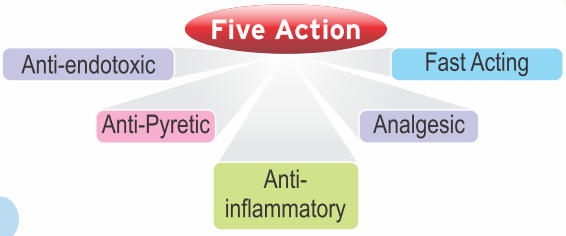
Withdrawal period:

Milk : 54 days after last treatment 96 hours after calving.

Meat & offals : Zero days

RECENT INTRODUCTION

Finadyne®



- Fast acting, most potent NSAID
- Manages endotoxemia and inflammation

Composition :

Each ml contains:

Flunixin Meglumine IP	83 mg
Equivalent to Flunixin	50mg

Indications:

In Cattle, Sheep, Goat, Camel - for the control of inflammation and pyrexia associated with mastitis, respiratory disease and metritis

In Horse: For the alleviation of inflammation and pain associated with musculo-skeletal disorders

In Dogs: For use to alleviate Fever, Inflammation, endotoxemia or Sepsis

Withdrawal period:

Cattle - Milk: 24 hours after last treatment
Meat : 5 days from the last treatment Horse
Horse - Meat : 7 days from last treatment Pigs
Pig - Meat : 22 days from last treatment

Dose and Administration:

Cattle, Sheep, Goat and Camel: 1.1 mg to 2.2 mg Flunixin per kg body weight or 1 to 2 ml of Finadyne injection per 45 kg body weight given by slow intravenous or intramuscular administration.

Horses: by slow intravenous injection for Musculo-skeletal disorder at rate of 1ml per 45 kg bodyweight (1.1 mg Flunixin/kg) once daily for up to 5 days

Dog: by intramuscular or slow intravenous at dose rate of 0.5-1 mg/kg body weight as a single dose or if necessary once a day for not more than 3 days.

MSD
Animal Health

RECENT INTRODUCTION

CHIKVIT Liquid (VET)

COMPOSITION

Consists of Vitamin A, Vitamin B complex and Vitamin D along with Essential Trace minerals. It also contains sorbitol as an instant energy source

BENEFITS

Helps in releiving the stress during transport

USAGE

Regular Supplementation 0.5ml per litre of drinking water
In stress condition
1 ml/lt through drinking water

PRESENTATION

1 lt

RECENT INTRODUCTION

KNZ™

Globally accepted scientific way to provide salt

Free choice salt and mineral licks

UNIVERSAL MULTI
Daily support

Ensures a daily balanced intake - with iron

Available in 4 x 5 kg lick

Component	Value
Sodium chloride	> 99%
Magnesium	2000 mg/kg
Zinc	810 mg/kg
Iron	3000 mg/kg
Iodine	50 mg/kg

FERTILITY
Stimulates fertility

Stimulates fertility with higher level of selenium, iodine and vitamin E-plus yeast selenium for higher effectiveness

Available in 4 x 5 kg lick

Component	Value
Sodium chloride	> 99%
Magnesium	2000 mg/kg
Selenium	23 mg/kg
Selenium as yeast	2 mg/kg
Vitamin E	1000 IU/kg
Iodine	300 mg/kg

One 5 kg lick may be consumed by one animal in approximately 6 months.
(However the consumption depends on more than one factor).

RECENT INTRODUCTION

Transmix™

- Eases the calving stress
- Improve immunity and waning the chances of retained placenta and metritis
- Optimises milk production

Instant & Sustained

Nutrients supplementation for maximizing profits in transition period

Precaution :

Take necessary precaution to avoid accidental entry into Trachea, Lungs & contact nearest veterinarian if animal exhibits any signs of discomfort

After calving

Recommendation

- Ketosis
- Negative energy balance
- Hypocalcemia

Floxidin™ LA (Vet)

(Enrofloxacin 10%)

First Line Single Shot Therapy

- Broad spectrum action against gram positive and gram negative bacteria
- Antibiotic property remains for 48-78 hours.

Presentation: 50 ml

WITHDRAWAL PERIOD :
Milk : 84 hrs.
Meat : 14 days

Indications

- **Systemic Infections** - Mastitis, Metritis, Pneumonia, Gastro-intestinal infections
- **Soft Tissue infections** - Wounds, Post Surgical recovery, supportive treatment in cases of FMD

Dose of Floxidin™ LA (VET)

Body wt(Kg)	Floxidin™ LA (Ml)
30	3
50	5
100	10
200	20
300	30
400	40
500	50

At the dose rate of 1ml/ 10 Kg BW

MSD Animal Health

HORMONES

Receptal® VET.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Buserelin acetate 0.0042 mg equivalent to 0.004 mg buserelin.	• True anoestrus	5 ml, IM	Vial of 10 ml and 2.5 ml
	• Improvement of conception rate (at the time of AI)	2.5 ml, IM	
	• Ovarian cyst (Follicular), Irregular oestrus, Nymphomania	5 ml, IM	
	• Delayed ovulation & Anovulation	2.5 ml, IM	
	• Improvement of pregnancy rate (11-12 days post AI)	2.5 ml, IM	WITHDRAWAL PERIOD Milk : 0 (Zero) days Meat : 0 (Zero) days
	• Improvement of post partum fertility (10-15 days post-calving)	5ml, IM	

CHORULON®

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each vial contains human Chorionic Gonadotrophin (hCG) 1500 IU as freeze dried pellet of natural glycoprotein human Chorionic Gonadotrophin	• Improvement of conception rate (cows/buffaloes)	1500 IU at AI or mating, IM or IV	Box containing 5 vials (1500 IU each) with 5 vials of solvent
	• Enhancement of luteal function post AI	1500 IU, 4-6 days post AI, IM	
	• Cystic Ovarian Disease (anoestrus, prolonged estrus, nymphomania)	3000 IU, IV	
	• Induction of ovulation (mares)	1500-3000 IU, IM or IV, 24 hours before AI/mating	WITHDRAWAL PERIOD Milk : 0 (Zero) days Meat : 0 (Zero) days

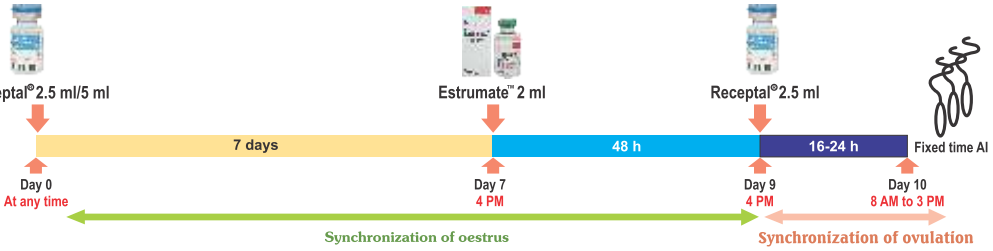
FOLLIGON®

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each vial contains Pregnant Mare Serum Gonadotrophin injection (Freeze dried) 1000 IU	Females: • Anoestrus	Cow/Buffalo Anoestrus : 500 - 1000 IU IM	Box containing 5 vials (1000 IU each) with 5 vials of solvent
	• Super ovulation	Super ovulation: 1,500-3,000 IU, IM between day 8-13 of cycle	
	• Increase of fertility rate after progestagen pre-treatment	300-750 IU, IM, at the end of a progestagen treatment	WITHDRAWAL PERIOD Milk : 0 (Zero) days Meat : 0 (Zero) days

Making calf a year a reality

Oestrus Management in Dairy Cattle

Goal: One Calf per Cow per Year



ANTI-INFECTIVE

COBACTAN 2.5%

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml of suspension contains 29.64 mg Cefquinome Sulphate (equivalent to 25 mg Cefquinome).	Cattle • Respiratory disease caused by *Pasteurella multocida* and *Mannheimia haemolytica* • Digital dermatitis, infectious bulbar necrosis and acute interdigital necrobacillosis (foul in the foot) • Mastitis Calf • *E. coli* septicaemia	1 mg cefquinome/kg bw MI (2ml/50 kg bw) 1 mg cefquinome/kg bw MI (2ml/50 kg bw) 1 mg cefquinome/kg bw MI (2ml/50 kg bw) 2 mg cefquinome/kg bw MI (4ml/50 kg bw)	50 ml multidose vial. WITHDRAWAL PERIOD Cattle : Meat : 5 days, Pig : Meat : 3 days Milk : 1 day

COBACTAN LC

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each syringe of 8 gm contains 75 mg Cefquinome sulphate as active ingredient.	For the treatment of clinical mastitis in lactating cows caused by *Staphylococcus aureus, Streptococcus uberis, Streptococcus dysgalactiae, Escherichia coli* & other entero-bacteria susceptible to cefquinome.	Gently infuse the contents of one syringe into the teat canal of the infected quarter every 12 hours after each of 3 successive milkings. Milk out the affected quarter (s). After thoroughly cleaning & disinfecting the teat & teat orifice, gently infuse the contents of one syringe into affected quarter. Disperse the product by gently massaging the teat & udder of the affected animal.	Box of 3 injectors with 3 isopropyl alcohol soaked towels WITHDRAWAL PERIOD Milk : 84 hours (7 milkings) Meat : 2 days

Floxidin™ VET

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Floxidin 10% injection : Each ml contains - Enrofloxacin I.P. 100 mg	- Alimentary canal e.g. Enteritis, calf scours. - Respiratory tract e.g. Pneumonia - Urogenital system e.g. Metritis, cystitis - Skin e.g. Bacterial dermatitis, pyodemra. - Mastitis, & Haemorrhagic Septicaemia.	Floxidin can be given once daily, for 3-5 days. Cattle, Sheep & Goat 2.5-5 mg/kg body weight IM Dog/Cat (adult) 5 mg/kg body weight IM Camel 2.5 mg/kg body weight IM	15 ml, 50 ml Now also available 100 ml WITHDRAWAL PERIOD Milk : 3.5 days Meat : 14 days

Tetracycline WSP VET

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each gm contains Tetracycline Hydrochloride I.P. 50 mg	In Sheep & Goat : Pneumonia, Joint ill, Anthrax, Septicaemia, Contagious Caprine Pleuro-Pneumonia, Scours, Acute Mastitis, Acute Metritis, In Cattle : Infectious diseases like Haemorrhagic septicaemia, Anthrax, Black Quarter, Leptospirosis, Foot Rot & Contagious Bovine Pleuro-Pneumonia, Calf Scours, Calf Diphtheria, Pneumonia, Septicaemia, Acute Metritis, Acute Mastitis.	Sheep & Goat : 1 gm/kg body weight Cattle : 2.5-5 gm/15kg body weight for 5 days	Sachet of 100 grams WITHDRAWAL PERIOD Milk : 7 days Meat : Cattle:22 days Poultry : 5 days Pig, Sheep & Goat : 28 days

METRICEF™

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each single dose syringe of 19 g contains: Cephapirine Benzathine intrauterine suspension in pre filled syringe-500 mg	• Subacute/chronic endometritis in cows over 14 days postpartum • Repeat breeders (3 or more unsuccessful inseminations).	Single dose syringe to be administered intra-uterinely	Single dose (19 g) syringe provided with a separate disposable catheter and a glove. WITHDRAWAL PERIOD Meat & offals : 24 hours Milk :0 (Zero) hours

MSD Animal Health

PARASITE CONTROL

butox® Vet

Highly effective & safe ectoparasiticide only for external use.
Ideally suited for control of ticks, mites, lice & flies of livestock, poultry, dogs & farm houses.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Deltamethrin I.P. 12.5mg	To control the ectoparasites in cattle, sheep, goats, horses, camels, dogs & farm houses.	Spray or dip : Ticks : 2 ml/lit Mites : 4 ml/lit Flies : 2 ml/lit Lice : 1 ml/lit	Aluminium container of 5 ml, 15ml, 50 ml, 250 ml and 1 lit with plastic measuring cup WITHDRAWAL PERIOD Milk : 0 (Zero) day Meat : 20 days

Taktic® 12.5% EC

Broad spectrum ectoparasiticide effective against ticks, mites, lice & keds

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Amitraz I.P. (Vet) 125 mg	1. For prevention & control of ectoparasitic infestation like ticks, mites, lice & keds in cattle, sheep, goat, camel & pig. 2. Taktic kills tick, mite and lice. 3. Taktic kills organochlorine, organophosphate & pyrethroid resistant strains of ectoparasites.	Taktic 12.5%/lit of water for ticks : Cattle/Buffaloes/Camel: 2.0 ml Sheep/Goat : 4.0 ml Pigs : 4.0 ml Taktic 12.5%/L of water for mites and keds : Cattle / Camel : 2.0 ml Sheep/Goat : 4.0 ml Pigs : 4.0 ml	Tin Container of 6 ml, 15 ml, 50 ml & 250 ml with plastic measuring cup. WITHDRAWAL PERIOD : Milk : 4 milking/2 days Meat : 1 day for cattle & goat 7 days for sheep & pig

Panacur® VET

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
The active ingredient of Panacur is Fenbendazole which is the research molecule of Intervet/Schering-Plough Animal Health. Each 1.5 g Bolus contains 1.5 g of active Fenbendazole. I.P. Each 150 mg tablet contains 150 mg of active Fenbendazole. I.P.	Infestation of cattle, buffaloes, sheep, goat & horses with gastro-intestinal nematodes, lungworms & tapeworms such as *Haemonchus spp., Ostertagia spp., Trichostrongylus spp., Cooperia spp.* and *Nematodirus spp.*	Recommended for cattle, sheep, goat, horses & pigs. Panacur 150 mg tablet per 30 kg body weight & Panacur 1.5 gm bolus per 300 kg body weight (5 mg Fenbendazole per kg body weight). Dose for horses : 7.5mg/kg bw	Box of 1.5x2'-1.5 gm bolus Box of 5 x 2'- 3 gm bolus Box of 5 x 10'- 150 mg tablets. WITHDRAWAL PERIOD Milk : 4 days Meat : 8 days for large animals 14 days for sheep & Goat

Panacur® 25% Wettable powder (vet)

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each gram contains Fenbendazole I.P 250 mg	Infestations of cattle, buffaloes, Sheep & goats with gastro-intestinal nematodes, lungworms & tapeworms such as *Haemonchus spp., Ostertagia spp., Trichostrongylus spp., Cooperia spp., Nematodirus spp., Neoascaris vitulorum, Oesophagostomum spp., Chabertia spp., Bunostomum spp., Gaigeria pachyscelis, Capillaria, Trichuris spp., Strongyloides spp., Dictyocaulus filaria, Dictyocaulus viviparus, Moniezia spp., Infestation of dogs with Ancylostoma spp., Infestation of horses with strongyles, Ascarids, Ascarids (Parascaris), Oxyuris & Strongyloides Infestation of pigs with Hyostrongylus rubidus, Oesophagostomum spp., Ascaris suum, Trichuris suis & Metastrongylus spp.*	Recommended for cattle, sheep, goat & pigs. Infestation with gastrointestinal nematodes & lungworms : (5 mg Fenbendazole per kg body weight) Suspension to be made by mixing clean water as: 6 g with 100 ml 60 g with 1 lit. 120 g with 2 lit.	6 g sachet, 60 g & 120 g container WITHDRAWAL PERIOD Milk : 4 days Meat : 8 days for large animals 14 days for sheep & Goat

PARASITE CONTROL

Panacur® 2.5% Suspension (VET)

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains 25 mg of Fenbendazole I.P.	Infestation of cattle, buffaloes, sheep & goats with gastrointestinal nematodes lungworms & tape worms such as *Hoemonchus spp., Ostertagia spp., Trichostrongylus spp., Cooperia spp., Nematodyrus spp.,*	Dose recommended for cattle, buffaloes, sheep, goats & pigs' infestation with gastrointestina nematodes & lungworms: (5 mg Fenbendazole per kg body weight)	450 ml and 1 lit HDPE bottle pack of Panacur 2.5% suspension. WITHDRAWAL PERIOD Milk : 4 days Meat : 8 days for large animals 14 days for sheep & Goat

Tolzan® Plus-L

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Oxyclozanide I.P. - 3.4% w/v Levamisole Hydrochloride I.P. - 2.5% w/v	• Tolzan Plus-L treats the round worms and liver flukes in cattle, sheep and goats • Tolzan Plus-L controls adult and immature stages of conical flukes also (Paramphistomum spp.) Tolzan Plus-L can be used safely in pregnant animals during all stages of pregnancy. • Tolzan Plus-L can be safely given to all cattle, sheep and goats without any pre-dosing, starving or change of diet.	Cattle: 90 ml for 300 kg live mass PO Sheep and goats: 9 ml for 30 kg live mass PO	120 ml HDPE bottle, 1 Ltr can WITHDRAWAL PERIOD Milk : 7 days Meat : 14 days

Tolzan® F VET

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml of suspension contains Oxyclozanide I.P suspension of 3.4% w/v	1) Tolzan -F is used in the treatment of acute & chronic Fascioliasis in cattle, buffaloes, sheep & goats. The important species are : a) *Fasciola hepatica* b) *Fasciola gigantica* 2) Tolzan -F is also used to treat paramphistomiasis. The species involved are : *P. microbrothriodes, P. microbrothridium, P. gotal, P. orthocoelium* 3) Tolzan -F also acts on *Monezia* tapeworm in sheep.	Cattle & Buffalo : Orally 10-15 mg/kg body weight Sheep & Goat: Orally 15 mg/kg body weight	90 ml HDPE bottle & 1 ltr jerry can. WITHDRAWAL PERIOD Milk : 7 days Meat : 14 days

Berenil® VET 7% RTU

As treatment & control therapy of Babesiosis, Trypanosomiasis and Theileriosis

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Diminazine Aceturate 70 mg Phenazone B. P. 375 mg	Babesiosis & Trypanosomiasis, Tenacious Trypanosomiasis, Theileriosis & mixed infections, Pyrexia of Unknown Origin	Babesiosis and Trypanosomiasis at 5-10 ml per 100 kg b.w. Resistant strains of Trypanosomiasis at 10 ml per 100 kg b.w. Theileriosis & Mixed infections at 5 -10 per ml 100 kg b.w. along with antibiotic (3-4 antibiotic injections on alternate days)	Amber coloured vials of 20 ml, 30 ml and 90 ml WITHDRAWAL PERIOD Milk : 3 days Meat : 20 days

SUPPORTIVES

Tonophosphan® VET

Injectable phosphorus preparation for improving metabolism, milk production & fertility in livestock. Its content of organically bound phosphorus is 20%.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Sodium salt of 4-dimethylamine, 2-methylphenyl-phosphinic acid 0.2 g	As a tonic in general metabolic disorders, debility, exhaustion, repeat breeding & infertility due to phosphorus deficiency. For disorders of bone formation as in rickets & osteomalacia. To promote callus formation in fractures in combination with calcium & vitamin D. For treatment of tetany & paresis resulting from calcium, magnesium & phosphorus imbalance (as in milk fever).	Large Animals : 5-20 ml. Small Animals : 1-3 ml. In chronic conditions- Large Animals : 2.5-5 ml Small Animals : 1-2 ml.	Vial of 10 ml and 30 ml Now also available 100 ml vial

VM^{all}™

CONTENTS PER KG	BENEFITS	DOSAGE	PRESENTATION
Each Kg contains a nutritional value of : Cobalt 120mg, Copper 1000mg, Magnesium 5000mg, Iron 2500mg, Potassium 100mg, Manganese 2000mg, Flourine 60mg, Calcium 150g, Selenium 10mg, Vit A 1200000 IU, Vit D3 120000 IU, Sulphur 0.70%, Vit E 1200 IU, Iodine 300mg, Zinc 5000mg, Phosphorus 60g, Niacinamide 4g, Vit K 200mg, Sodium 8mg.	To improve on fertility. To safeguard health and growth. To optimize milk yield and fat.	Ruminants Mix 100-200 g per 10 kg of feed depending on the availability of other fodder/feed. For direct feeding, Cow and Buffalo: 25-30 g/head/day Calf, Sheep and Goat: 15-20 g/head/day Aqua: Mix 100g to 10 kg of fish feed.	1 kg Zip-Locked pouch with measuring spoon. 5 Kg & 25 Kg bag

VM^{all}™ - P

CONTENTS PER KG				BENEFITS	DOSAGE	PRESENTATION
Each KG contains a nutritional value of (When packed):				• To improve on fertility • To safeguard health and growth. • To optimize milk yield and fat.	Ruminants Mix 100-200 g per 10 kg of feed depending on the availability of other fodder/feed. For direct feeding, Cow and Buffalo: 25-30 g/head/day Calf, Sheep and Goat: 15-20 g/head/day Aqua: Mix 100g to 10 kg of fish feed.	25 kg Sealed bag Now also available 5 Kg bag
Cobalt	150 mg	Vit A	1200000 IU			
Copper	2200 mg	Vit D3	120000 IU			
Iodine	325 mg	Vit K	200 mg			
Iron	2500 mg	Vit E	500 IU			
Magnesium	6000 mg	Calcium	225 g			
Manganese	2200 mg	Phosphorus	90 g			
Potassium	100 mg	Niacinamide	1000 mg			
Sodium	8 mg	Biotin 2%	500 mg			
Sulphur	1%	Bioactive				
Zinc	9000 mg	chromium	65 mg			

SUPPORTIVES

Rumicare® (Vet)

Normalises milk production by restoring ruminal activity.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each gm powder contains : Calcium Propionate 480.00 mg Methionine 40.00 mg Picrorhiza Dry Extract 2.00 mg Cobalt Gluconate 0.32 mg Vitamin B_6 IP 0.32 mg Dextrose Anhydrous IP 428.00 mg	Bloat, digestive disorders caused by decreased activity of reticulum & rumen or sudden dietary changes &/ or intoxication. As a supportive therapy in diseases caused by foreign bodies & hypo-glycaemic conditions in cattle, calves, sheep & goats.	Adult Cattle : 125 gm sachet twice daily, (once in 12 hours Young Animals : 65 gm (approx) once or twice daily Sheep & Goat : 32 gm once or twice daily	125 g sachet

Avilin® Vet

For quick relief from allergic manifestations.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains: Pheniramine maleate IP 22.75 mg.	Itching due to eczema, dermatitis, urticaria, skin oedema, insect bites, photo-dermatitis, rhinitis, tail eczema in horses, stomatitis & inflammation of the hooves of cattle, serum sickness, paresis during pregnancy, toxaemia & retention of placenta, pulmonary oedema in cattle, pulmonary emphysema in horses.	Large animals : 5-10 ml. Small animals : 0.5-1 ml. or more. By IM or IV route	Amber coloured vial of Avil 10 ml and 33 ml WITHDRAWAL PERIOD Milk : 2 days Meat : 7 days

Prednisolone Acetate Injection

For quick relief from ketosis.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Prednisolone acetate I.P. 10 mg	Prednisolone is indicated in ketosis in dairy cattle, shock, inflammations (especially rheumatic arthritis, dermatitis, bursitis) and allergic conditions of livestock	Cattle, horses : 5-20 ml. Calves, pigs : 2.5-5ml. Piglets, dogs, cats :1-3 ml. or as recommended by Veterinarian.	Vial of 10 ml WITHDRAWAL PERIOD Milk : 3 days Meat : Cattle Sheep & Goat : 5 days Pig : 28 days

Vetalgin® VET

Highly effective analgesic, antispasmodic, antirheumatic & antipyretic agent.

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Analgin I.P. 0.5 g Chlorbutol (as bacteriostat) 0.4% w/v	For relief from pain, fever, labour, spastic condition of cervix during parturition, rheumatic conditions, neuritis, neuralgia, retention of placenta, dysentry, bloat & gastritis in domestic animals.	Preferably intravenous, otherwise intramuscular or combination of IV/IM injection. Horse : 20-60 ml Cattle : 20-40 ml Foal, Calf : 5-15 ml Sheep, Goat : 2-8 ml Pig : 10-30 ml Dog : 1-5 ml	Vial of 33 ml WITHDRAWAL PERIOD Milk : 2 days Meat : Cattle 12 days/Pig 3 days & Horse IV 5 days

MSD Animal Health

COMPANION ANIMAL

Nobivac®:Puppy DP

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each 1 ml dose contains : live infectious canine distemper virus strain Onderstepoort minimum 5.0 $\log_{10}$ $TCID_{50}$ Live infectious canine parvo virus strain 154 minimum 7.0 $\log_{10}$ $TCID_{50}$	Active immunization of dog against CDV and CPV.	Reconstitute one vial of Nobivac Puppy DP in one vial of Nobivac Solvent & inject subcutaneously.	One box contains 10 vials of 1 dose.

Nobivac®:DHPPi

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each 0.5 ml dose contains : Live infectious canine distemper virus (CDV) strain Onderstepoort at least 4.0 $\log_{10}$ $TCID_{50}$ Live infectious canine adeno virus type 2 (CAV_2) strain Manhattan LPV_3 at least 4.0 $\log_{10}$ $TCID_{50}$ Live injections canine parvo virus (CPV) strain 154, at least 7.0 $\log_{10}$ $TCID_{50}$ Live injections canine para-influenza virus (CPI) strain cornell at least 5.5 $\log_{10}$ $TCID_{50}$	Vaccination against CDV, CAV2, CPV & CPi. Besides providing protection against CAV2 disease entities such as respiratory tract infections, the vaccine also protects against infectious canine hepatitis (ICH) caused by CAV1.	Reconstitute the contents of one vial of Nobivac DHPPi in one vial of Nobivac Solvent, Nobivac Lepto, Nobivac Rabies or Nobivac RL immediately prior to use & inject subcutaneously.	One box contains 10 vials of 1 dose.

Nobivac®:Lepto

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each dose contains inactivated strains of : Leptospira interrogans serotype Canicola strain Ca-12-000 $\geq$ 957 units/ml and Leptospira interrogans serotype Ictero haemorrhagiae strain 820K $\geq$ 625 units/ml	Active immunisation against Leptospirosis caused by *L.icterohaemorrhagiae* & *L.canicola of Leptospira interrogans.* Animals are protected against clinical disease, & also against becoming renal carriers after challenge.	Inject 1 ml of Nobivac Lepto subcutaneously. Nobivac Lepto can also be used to reconstitute Intervet's freeze dried vaccines Nobivac Puppy DP & Nobivac DHPPi.	One box contains 10 vials of 1 dose

Nobivac®:Rabies

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each 1 ml dose contains rabies virus (Pasteur RIVM Strain) inactivated $\geq$ 2 IU	For the active immunisation of healthy dogs, cats, cattle, sheep, goats, horses and in principle all healthy mammals against Rabies & can be used for both (prophylactic immunisation & post bite therapy.	1 ml by subcutaneous or intramuscular injection. Shake well before use.	One box contains 1 ml x 10 vials or one box contains 10 ml x 10 vials

Nobivac®:RL

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each 1 ml dose contains : Rabies virus inactivated antigen suspension $\geq$ 3.0 IU Leptospira interrogans sero group Canicola $\geq$ 40 hamster PD_{80} Leptospira interrogans sero group icterohaemorrhagies $\geq$ 40 hamster PD_{80}	For the active immunisation of dogs against rabies, and canine leptospirosis caused by *L.interrogans* serogroups *canicola* and *icterohaemorrhagiae*.	1 ml by subcutaneous injection. Can be used to reconstitute Nobivac DHPPi. Intended for dogs from 8 weeks of age onwards.	One box contains 1 ml x 10 vials.

COMPANION ANIMAL

Nobivac® KC

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each (0.4 ml) dose Contains Brodetella bronchiseptica strain B-C2 - > 108.0 CFU and canine para influenza virus stain Cornell > 103.0 TCID50	Active immunization of dogs against Kennel Cough.	Nobivac KC aims to make administration as easy as possible: ● Low 0.4 ml dose ● Single nostril only Can be used with or without applicator	One box contains 5 vials of dose and 5 vials of diluent along with one applicator

Taktic® 5% EC

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Amitraz I.P. 50 mg	It is indicated for the topical treatment of Demodectic & Sarcoptic Mange, ticks & lice in dogs.	Mixing Rate / lit of water: Ticks & lice - 6 ml Mites - 10 ml 3-5 applications for mange and 2 applications for ticks & lice at weekly intervals. Taktic to be used as dip or spray	Glass bottle of 25 ml with plastic measuring cup

Taktic® 12.5% EC

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains : Amitraz I P 125 mg	It is indicated for the topical treatment of Demodectic & sarcoptic Mange, ticks & lice in dogs	Mixing Rate/ lit of water Demodectic Mange – 4 ml Sarcoptic Mange – 2 ml Ticks & Lice – 2 ml In severe cases of infestation a second treatment is recommended 5-10 days after the first.	Glass bottle of 25 ml with plastic measuring cup

San Coat®

NUTRITIONAL VALUE	BENEFITS	DOSAGE	PRESENTATION
Essential Fatty Acids (Linoleic Acid, Alpha Linolenic Acid, Gamma Linolenic Acid, Eicosapentaenoic Acid and Docosahexaenoic Acid) Vitamins (Vitamin A and E, Biotin and Pyridoxine) Zinc and Inositol Omega 6 and Omega 3 fatty acids in 6:1 ratio	San Coat is indicated as an aid in the management of allergic and inflammatory skin conditions like alopecia, dull and dry hair coat, pruritis, atopic dermatitis, *Malassezia pachydermatis*, pyoderma, mange etc. in dogs.	Pour measured dose on food once daily according to the following schedule. 0.3 to 1.0 ml per kg body weight. Under 7 kg - 3.75 ml 7 - 23 kg - 7.5 ml Over 23 kg - 15.0 ml	Container of 150 ml (bettix shape)

DELVOSTERON®

COMPOSITION	INDICATIONS	DOSAGE	PRESENTATION
Each ml contains proligestone Injection 100 mg	Suppression & postponement of oestrus in the bitch, treatment of pseudo pregnancy in the bitch, suppression and postponement of oestrus in the queen and suppression and postponement of oestrus in the ferret.	Dogs Body weight — Dosage < 3 kg — 1.0 ml 3-5 kg — 1.0-1.5 ml 5-10 kg — 1.5-2.5 ml 10-20 kg — 2.5-3.5 ml 20-30 kg — 3.5-4.5 ml 30-45 kg — 4.5-5.5 ml 45-60 kg — 5.5-6.0 ml > 60 kg — 1 ml/ 10 kg	20 ml Vials

MSD Animal Health

COMPANION ANIMAL

DERMA STRENGTH™

NUTRITIONAL VALUE		BENEFITS	DOSAGE	PRESENTATION
Active Ingredients per 1 tablet :		• Collagen production • Skin texture • Circulation • Immune system response and circulation • Tissue recovery • Normal histamine levels • Provides support during allergy season	Directions for use or as directed by a veterinarian : Give 1 tablet per 10 kg of body weight daily. If giving more than 1 tablet daily, divide between AM and PM.	30 tablet
Methylsulfonylmethane (MSM)	75 mg			
N, N-Dimethylglycine Hcl (DMG	50 mg			
DL-Methionine	50 mg			
L-Cysteine	50 mg			
Grape Seed (Vitis vinifera) Extract	30 mg			
Ascorbic Acid (Vitamin C)	25 mg			
L-Proline	25 mg			
Perilla (Perilla frutescens) seed Extract	20 mg			
dl-alpha Tocopheryl Acetate (VitaminE)	10 IU			
Zinc (Zinc Citrate)	5 mg			
Hyaluronic Acid (HA)	5 mg			
Niacinamide (Vitamin B3)	4 mg			
Retinyl Acetate (Vitamin A)	37 IU			

CANINE PLUS™

NUTRITIONAL VALUE		BENEFITS	DOSAGE	PRESENTATION
Guaranteed Analysis Represents Minimum Levels per Tablet Unless otherwise Specified :		• Enhances immunity, support bone formation. Blood formation • Nerve formation, skin health, general health, antistress and antioxidant function	Directions for use or as directed by a veterinarian : Under 20 kg : 1 tablet daily Over 20 kg : 2 tablets daily When more than one tablet per day is required, dividing between AM and PM is optional.	30 and 60 tablet presentation
Moisture (max	5.655%			
Methionine	3.75 mg			
Calcium (6.25%)	37.5 mg			
Phosphorus (3.13%)	18.75 mg			
Potassium (0.03%)	0.187 mg			
Magnesium (3.13%)	18.75 mg			
Iron (3750 ppm)	2.25 mg			
Copper (3.33 ppm)	0.002 mg			
Zinc (1250 ppm)	0.75 mg			
Iodine (10 ppm)	0.006 mg			
Selenium (3.33 ppm)	0.002 mg			
Vitamin A	450 IU			
Vitamin D3	37.5 IU			
Vitamin E	3.75 IU			
Thiamine (Vitamin B1)	3.75 mg			
Riboflavin (Vitamin B2)	1.875 mg			
Panthothenic Acid	3.75 mg			
Niacin	3.75 mg			
Vitamin B6	1.875 mg			
Folic Acid	0.001 mg			
Vitamin B12	0.001 mg			
Choline	3.75 mg			
Biotin	0.001 mg			
Ascorbic Acid (Vitamin C)	9.375 mg			
Bromelain (Pineapple)	0.675 GD Units			

COMPANION ANIMAL

BLADDER STRENGTH

NUTRITIONAL VALUE	BENEFITS	DOSAGE	PRESENTATION
Active Ingredients per Tablet : Pumkin Seed Powder 150 mg Rehmannia glutinosa (root) Powder 150 mg Wild Yam Extract 150 mg Soy Protein Extract 100 mg Corn Silk Powder 60 mg Saw Palmetto Extract 60 mg OliveLeaf (15% Oleuropein) Extract 50 mg Pyridoxine HCl (Vitamin B6) 25 mg	• Deals with urinne incontinence problems in male and female dogs which is due to less level of estrogen on testosterone. • These dogs are basically geriatric dogs, bitches post sparying , animals with poor anatomical disposition or having urinary tract infection.	Give one tablet per 14 Kg or 30 ponds of body weight. half tablet for animal - less than 30 Ponds of weight If giving more than one tablet, divide between AM and PM	30 tablets presentation

CARDIO STRENGTH™

NUTRITIONAL VALUE	BENEFITS	DOSAGE	PRESENTATION
Active Ingredients per Capsule : L-Carnitine HCl 125 mg L-Taurine 125 mg N, N-Dimethylglycine HCl 25 mg d-alpha Tocopheryl Succinate (Vitamin E) 30 IU Coenzyme Q10 10 mg Folic Acid 0.9 mg Magnesium (as Magnesium Citrate) 0.5 mg Potassium (as Citrate/Malate) .01 mg Selenium (as Sodium Selenite) 0.007 mg	• Dogs and cats with pre-existing sub-optimal cardiovascular functions • Breeds of dogs and cats that are predisposed to cardiovascular stress • Support of geriatric patients	Directions for use or as directed by a veterinarian : Cat : Give 1 capsule daily. Dogs : Give 1 capsule, per 10 kg of body weight, daily. If giving more than 1 capsule, divide between AM and PM.	30 and 60 tablet

GLYCOFLEX®

NUTRITIONAL VALUE	BENEFITS	DOSAGE	PRESENTATION
Active Ingredients per Tablet : Glucosamine HCl (Shrimp and Crab) 375 mg Pena Canalicus (Glycomega™ brand Green Lipped Mussel) 300 mg Methylsulgonylmethane (MSM) 250 mg N, N-Dimethylglycine HCl (DMG) 50 mg Manganese (as Mn Proteinate) 5 mg	• Glyco FLEX Canine represents our comprehensive support for dogs needing moderate joint support. • These delicious chewable tablets are also recommended for adult and maturing dogs, sporting and working breeds as well as support normal recovery after orthopedic surgery.	Directions for use or as directed by a veterinarian : Up to 15 kg :½ tablet daily 15.5 kg-30 kg : 1 tablet daily 30.5 kg-45 kg : 2 tablet daily 45.5 kg & over : 2 ½ tablets daily If giving more than 1 tablet, divide between AM and PM.	30 and 60 tablet presentation

RENAL ESSENTIALS

NUTRITIONAL VALUE	BENEFITS	DOSAGE	PRESENTATION
Active Ingredients per Tablet : Astragalus Root Powder 60 mg Rehmannia glutinosa Root Extract 50 mg Nettle (Urtica dioica) Seed Extract 50 mg Cordyceps sinensis Extract 50 mg Lecithin 50 mg L-Arginine 50 mg N, N-Dimethylglycine HCl (DMG) 25 mg Potassium (K Gluconate) 8.25 mg Inositol 8 mg Pyridoxal 5-Phosphate (Vitamin B6) 8 mg Thiamine (Vitamin B1) 4 mg Riboflavin (Vitamin B2) 4 mg Choline 4 mg Folic Acid 0.15 mg Methylcobalamin (Vitamin B12) 0.05 mg	• Renal circulation • Immune and antioxidant defense system function • Homocysteine balance • Normal fluid retention • Stress management • Kidney and liver function • Normal detoxification	Directions for use or as directed by a veterinarian : Give 1 tablet per 10 kg of body weight, day For dogs less than 7 kg, give 1/2 tablet daily If giving more than 1 tablet, divide between AM and PM.	45 tablets presentation

MSD Animal Health

POULTRY PRODUCTS

Live Vaccine

Nobilis® Gumboro 228E

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Live Gumboro disease virus strain 228E at least 2.0 $\log_{10}$ EID_{50}	The vaccine is recommended for active immunization of chicken against Gumboro Disease (IBD)	One dose per bird through drinking water	1000 ds 2500 ds

Nobilis® Gumboro D78

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Live Gumboro disease virus strain D78 at least 4.0 $\log_{10}$ $TCID_{50}$	The vaccine is recommended for active immunization of chicken against Gumboro Disease (IBD)	One dose per bird through drinking water	1000 ds 2500 ds

Nobilis® ND Clone 30

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Live Newcastle Disease strain Clone 30 at least $10^{6.0}$ ELD_{50}	The vaccine is recommended for active immunization of chicken against Newcastle Disease	One dose per bird through drinking water, spray, intranasal/intra ocular	1000 ds 2500 ds 5000 ds

Nobilis® Ma5 + Clone 30

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each vial contains per dose at least 3,0 $\log_{10}$ EID^{50} live Avian Infectious Bronchitis Virus strain Ma5 and at least 6,0 $\log_{10}$ ELD_{50} of live Newcastle Disease Virus strain Clone 30 in stabilizer	Vaccination of chickens against infectious Bronchitis and Newcastle Disease. Vaccine can be used for primary as well as secondary vaccination.	Compatible with inactivated NDV vaccines (e.g. ND Broiler). Further, an extensive vaccination program has been tested involving live vaccines against Marek's disease, NDV, IBDV and IBV. The use of these vaccines did not affect the safety and efficacy of the individual products.	1000 ds 2500 ds 5000 ds

Nobilis® IB H120

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Live Injectious Bronchitis virus strain H120 at least 3.0 $\log_{10}$ EID_{50}	The vaccine is recommended for active Immunization of chicken against Infectious Bronchitis	One dose per bird through drinking water, spray, intra-nasal / intra-ocular	1000 ds 2500 ds 5000 ds

Nobilis® MG 6/85

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Live Mycoplasma gallisepticum strain MG 6/85 minimum $10^{6.5}$ CFU	The vaccine is recommended for active immunization of chicken to reduce the clinical signs of Mycoplasma gallisepticum infection.	One dose per bird through intraocular	1000 ds

Cell Associated Vaccine

innovax™ ND-SB1

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each lyophilised ampoule per dose (1 ml) contains : Live Turkey Herpes virus strain HVT/NDV-F at least 1534 PFU/bird Marek's disease virus serotype 2 strain SB-1 at least 1514 PFU per bird dose	The vaccine is recommended for active immunization of chicken against Marek's Disease (MD) and Newcastle Disease (ND)	0.2 ml injection subcutaneously per chick in the neck	2000 ds 4000 ds

Inactivated Vaccine

Nobilis® MG inac

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Inactivated Mycoplasma gallisepticum strain MG 6/85 NLT 0.23 units	The vaccine is recommended for active immunization of chicken against infections caused by Mycoplasma gallisepticum.	0.5 ml S/C	500 ml (1000 ds)

Nobilis® E. coli inac

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each 0.5 ml dose contains : F11-antigen Suspension containing 100 µg F11-68.3 mg FT-antigen Suspension containing 100 µg FT-68.3 mg	The vaccine is recommended for passive immunization of broilers against colibacillosis by vaccination of broiler breeders	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® Salenvac T

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each ml contains, Formalin killed cells of Salmonella Enteritidis (phage type 4 strain 109) : 2 x 10^9 cells inducing $\geq$ 2 RP*, Formalin killed cells of Salmonella Typhimurium DT104 : 2 x 10^9 cells inducing $\geq$ 2 RP* (*relative potency)	The vaccine is recommended for active immunization of chickens against S. enteritidis and S. typhimurium and to give passive immunity against these agents in the progeny	0.1 ml for day-old chicks and 0.5 ml for older birds I/M	500 ml (1000 ds)

Nobilis® Newcavac

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each 0.5 ml dose contains: Inactivated ND virus (Clone 30) inducing $\geq$ 4 $\log_2$ HI Unit per 1/50th of a dose or $\geq$ 50 PD_{50} units/dose	The vaccine is recommended for booster vaccination of layers and breeding stock for protection against Newcastle Disease throughout the laying period	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® ND Broiler

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each 0.1 ml dose contains: Inactivated Newcastle Disease virus (Strain Clone 30) cantoning $\geq$ 20 PD_{50} units/dose or inducing $\geq$ 4 $\log_2$ HI Unit per 1/50 dose	The vaccine is recommended for the vaccination of Newcastle Disease in day-old chicks in areas where ND is endemic	0.1 ml S/C or I/M	200 ml (2000 ds)

Nobilis® Corvac

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each 0.5 ml dose contains: Inactivated Avibacterium paragallinarum Strain 083 (serotype A), at least 1 CPD_{70}*, Strain Spross (serotype B), at least 1 CPD_{70}, Strain H-18 (serotype C) at least 1 CPD_{70}. (*CPD_{70} : 70% chicken protective dose)	The vaccine is recommended for protection against Avibacterium paragallinarum infections in chicken	0.5 ml S/C	500 ml (1000 ds)

Nobilis® Coryza

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each 0.25 ml dose conrains : Inactivated Avibacterium paragallinarum Strain 083 (serotype A) at least 1 CPD_{70}, Strain Spross (serotype B) at least 1 CPD_{70}, Strain H-18 (serotype C) at least 1 CPD_{70}	The vaccine is recommended for protection against Avibacterium paragallinarum infections in chicken.	0.25 ml I/M or S/C	250 ml (1000 ds)

Nobilis® Reo inac

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Inactivated Reovirus strains 1733 and 2408, inducing $\geq$ 7.4 $\log_2$ ELISA units/dose per 1/50th dose	The vaccine is recommended for booster vaccination of breeding stock against Avian Reovirus to protect their offspring against Avian Reovirus infections	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® G + ND

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Inactivated infectious Bursal Disease virus (Strain D78) inducing $\geq$ 14.5 $\log_2$ VN units/dose, Inactivated Newcastle disease virus (Strain Clone 30) inducing $\geq$ 4 $\log_2$ HI units per 1/50th of a dose or containing $\geq$ 50 PD_{50} Units/dose	The vaccine is recommended for booster vaccination of future breeders to protect against Newcastle Disease throughout the laying period, and to induce high maternal antibody levels against infectious Bursal Disease in their offspring.	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® IB + ND

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains: Inactivated Infectious Bronchitis virus (strain M41) inducing $\geq$ 6.0 $\log_2$ HI units/dose, Inactivated Newcastle Disease Virus (Clone 30) inducing 4 $\log_2$ HI units per 1/50th of dose or $\geq$ 50 PD_{50} units/dose	The vaccine is recommended for the booster vaccination of layers and breeding stock for protection against Newcastle Disease and the Massachusetts type of Infectious Bronchitis.	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® IB multi + ND

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Inactivated Infectious Bronchitis virus (Strain M41) inducing $\geq$ 4.0 $\log_2$ VN units/dose, IB virus (Strain D249G) inducing $\geq$ 4.0 $\log_2$ VN units/dose, Inactivated Newcastle Disease virus (Strain Clone 30) inducing $\geq$ 4.0 $\log_2$ HI units per 1/50th dose or containing $\geq$ 50 PD_{50} units/dose	The vaccine is recommended for booster vaccination of layers and breeding stock for protection against the Massachusetts and D207/D274 (and related nephropathic) serotype of Infectious Bronchitis and Newcastle Disease.	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® IB + G + ND

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Inactivated Injections Bronchitis virus (strain M41) inducing $\geq$ 6.0 $\log_2$ HI units, Inactivated Injections Bursal Disease virus (Strain D78) inducing $\geq$ 14.5 $\log_2$ VN units, Inactivated Newcastle Disease Virus (Strain Clone 30) inducing $\geq$ 4 $\log_2$ HI units per 1/50th of a dose or Containing $\geq$ 50 PD_{50} units/dose	The vaccine is recommended for breeding stock: as a booster vaccination to protect against Newcastle Disease and the Massachusetts serotype of Infectious Bronchitis, and to induce high maternal antibody levels against Infectious Bursal Disease in their offspring	0.5 ml S/C or I/M	500 ml (1000 ds)

Nobilis® Reo + IB + G + ND

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Each dose contains : Inactivated Injections Bronechitis virus (Strain M41) inducing > 6.0 log_2 HI units Inactivated Injections Bursal Disease virus (strain D78) inducing > 14.5 log_2 VN units Inactivated NDV (Strain Clone 30) > 4 log_2 HI units per 1/50th of dose containing > 50 PD_{50} units/dose Inactivated Reo virus (Strain 1733 & 2308) inducing > 7.4 log_2 ELISA.	For vaccine of Chicken against disease caused by Reo-virus, infectious Bronchitis virus of Massachusetts type Newcastle Disease virus & injections bursal disease virus.	0.5 ml S/C or I/M	500 ml (1000 ds)

Feed Supplement

Enradin®

CONTENTS PER KG	BENEFITS	INCLUSION RATE	PRESENTATION
Each 1 Kg of Enradin contains 80 gm of Enramycine HCL	Helps in ease the incidence of sub-clinical necrotic entritis in chicken	5-10 ppm (63-125 gm) per ton of feed	20 Kg Withdrawal period - 7 days Avoid use in laying hens

Amnovit®

CONTENTS PER KG	BENEFITS	INCLUSION RATE	PRESENTATION
Scientifically Balance formulation of vitamins and amino acids	Helps in relieving the stress conditions by supporting vitamins and minerals	Through water 1gm/lit for 5-7 days Through feed 500gm/ton for 5-7 days	1 Kg

Pharma Product

Floxidin™

COMPOSITION	INDICATIONS	DOSE & ROUTE	PRESENTATION
Enrofloxacin 10% oral solution	The product is recommended for treatment of the common infections caused by gram-positive, gram-negative, anaerobes and mycoplasma species	10 mg per kg BW for 3-5 days	5 Lt Withdrawal period - Meat - 8 days Eggs - Stop using 14 days before laying

VAC-SAFE®

CONTENTS	BENEFITS	INCLUSION RATE	PRESENTATION
An effervescent tablet that dilutes easily and neutralizes the chlorine in the water	Helps in improving the quality of drinking water during vaccination	1 tablet /100 Lt water	Box of 30 tablet

A trusted source for comprehensive animal health solutions

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For more information,

visit www.msd-animal-health.co.in

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