JIVA, 6(2):2008

CAUSES AND CONSEQUENCE OF SHORTAGE OF MILK IN KERALA; WHO GAINS?

Rama Kumar V.

There are many unaddressed questions about the Milk controversy in Kerala. The Hon'ble Minister Mr. C. Divakaran had rightly expressed his strong opposition to hike in price as it neither enhanced the local procurement nor helped farmers. The decision to raise the price to Rs.19/- litre, had enabled the milk marketers and feed traders to exploit both the producers and consumers. Co-operative milk supplies established opposite the YMCA and Secretariat of Trivandrum was perhaps the forerunner of milk marketing organizations in Kerala. It was taken over by TRIMS and then KLD Board/ MILMA. The primary objective of MILMA is to help the unorganized dairy owners to sell their surplus milk "at will". It collects surplus milk through milk unions, and markets it to make enough profit to manage the institution; this includes crises management.

Dairy co-operatives of India handle less than 15% of the total milk produced. Despite this, over the years MILMA won the trust of consumers and now has no problem in marketing its milk or (some) milk products. In fact to meet its growing demand, MILMA was buying (cheap) milk from other states. Though this enabled MILMA to make profit and optimise the capacity of its milk plants, this action diverted its focus from milk production within Kerala. If MILMA/ KLD Board had studied the unorganized and private milk marketing system, (which handles 85% of milk market), it could have anticipated the present shortage. The shortage forced MILMA to procure milk costing nearly Rs.19/-per liter and incur a heavy loss. While MILMA found it difficult to procure milk, private operators are still procuring milk from the neighboring states and are marketing it in Kerala. The private agencies now exploit the shortage of milk and the higher price fixed by MILMA/ government. Though MILMA has earned the trust of consumers, the local milk unions of Kerala do not uniformly enjoy similar trust from dairy cattle owners. The difference between sale price and procurement price of milk goes beyond Rs.7/- per litre. Both producers and the public of Kerala feel that an overhead of nearly 100% is high (The price that milk unions give to local producers is far less that what meets the eye. Although milk unions claim to provide a procurement price of Rs.14.50 per litre to producers, in reality most farmers end up receiving between Rs.10-12 per litre as the milk is presumed to be priced and procured on the basis of fat content and SNF. Milma reconstitutes the procured milk at 3.00% and 1.5% fat levels and sells them at Rs.19/- per litre. In many cases the margin may go up to 100% if not more).

"Advices" made during the debates in the media, like opening more collection centres, selling the collected milk locally, removing the social stigma from dairy farming, import of better animals etc. need to be studied scientifically to identify the real reasons for shortage and low procurement. MILMA has assumed a unique and effective role in controlling the market price of milk, to the advantage of both the producers and consumers. This positive role of MILMA was obliterated by the recent action, of MILMA/ government and has opened a flood gate for price hike all over Kerala. A (scientific) study of the unorganized sector, could have helped MILMA to anticipate the shortage of milk in Kerala and/or identify the role of various factors like growing urbanization, consumerism, low production, poor factor productivity (the difference between input and output), reduction in the number of dairy animals, risks involved, social stigma attached to dairying or anything else? It could have also enabled preparedness and "crisis management". By allowing the price hike the government has leased out MILMA from applying its management skill to tackle a crisis. There are some other questions that remain unanswered.

The logic behind allowing all MILMA units to increase the price, when only one local (Trivandrum)

unit of MILMA was making loss is still unclear. A temporary loan from government or from any sister unit was a fair possibility. Writing off the loss as was done for sick mills, state transport corporation etc. was also possible, though in principle it is not a healthy method. By selling 7- 10 lakh litres of milk daily on a hike of Rs.3/- per liter, MILMA can make an additional gain of one crore rupees in three or four days and Rs.8-10 crores in a month's time. With rains the shortage of milk would be over all over India (as green grass grows); but it may not be possible to reduce the price or regain MILMA's power to control milk market. Though some organizations opposed it, the proposal to make-up the loss by selling "MILMA rich" would have been a better alternative. It affected limited consumers and did not disturb the price line. Though milk products were not "loss making", all organizations including the "Ksheera" (not part of MILMA) had increased the price of "value added products".

Globally production of liquid milk is considered uneconomic; the profit lies in products. Many developed countries provide subsidy to encourage the sale of liquid milk. India's milk unions under the initiation of the great stalwart Padma Bhushan (Dr.) Verghese Kurien has adopted a novel way of buying milk at a reasonable cost, extracting its fat or Solid Non-fat (SNF) or reconstituting milk with milk powder to meet the growing urban consumer demand and making profit in the process. But MILMA's option to procure milk from other states when small holders facing unfavorable market conditions withdrew from milk production fired back, when supply from other states were reduced during the summer (non-rainy season). It had no option when those states diverted milk for better returns. KLD Board/ MILMA could not (or did not?) study the impact of their policy on the local dairy development. The KLD Board's primary objective of livestock development first failed, when dairy owners preferred to bring animals from Tamil Nadu and Karnataka, to replace low yielding, infertile, old or diseased animals. Reasons for this are many.

The sequence of events of 2007 indicates that increased procurement price has not only, not, helped farmers but has also harmed them. When the procurement price of milk was increased by Re.1/ litre in 2007 the cost of goverment/ MILMA feed was raised by Rs 1.50/ Kg. This not only took away any gains from reaching the dairy owner, but also gave an opportunity for private feed vendors and suppliers to raise the price of their feed and other feed inputs. Gingly cake (Idayam brand) which was sold @ Rs.12-13/ Kg in retail shops sold at Rs 14.50 when the milk price rose by Re 1/- (now it is being sold at Rs 20.50/ Kg); ground nut cake sells at Rs.22/ Kg and coconut cake sells at Rs.14-15/ Kg. The paddy straw bundle gets smaller with each rise in milk price. Oil cakes, paddy straw and green fodder cover nearly 70-85% of the cost of inputs. The real benefit went to traders of feed & fodder and the private suppliers of milk from Tamil Nadu and Karnataka. Any government or milk union concerned with dairy owners' welfare, should reconsider their action. (There is a nominal supply of green grass to very few dairy owners. This involves heavy overhead, reaches very few who usually are made to wait hours to get the erratic supply. It is such disincentives, not lack of dignity, that discourage people from dairy farming)

Kerala Livestock Development Board (KLD Board) is established for the holistic livestock development in Kerala under the aegis of National Dairy Development Board (NDDB) an "institution of national importance". In 1982 KLD Board decided to separate milk marketing from its main activity. The KLD Board never had a breeding policy pragmatic to the conditions in Kerala, nor the one suitable for the type of dairy farming prevalent in the state. A number of seminars and conferences organised in Kerala focused only on import of high yielding animals and their breeding material. It would be pertinent to realize that in Kerala many, if not most, of the new born calves (and invariably all male calves) are sent to the butcher within 15 days of their birth. This action being cruel, the circumstances that lead to slaughter of freshly born calves need be considered. The expense for raising a calf would be Rs.500/ - per month. Rearing a calf for 10-12 months could cost the owner nearly Rs 5000/-. It is possible to buy a 8-10 month old calf from either Tamil Nadu or

Karnataka for Rs. 2000/-. Obviously, if Tamil Nadu or Karnataka imported elite animals, (in place of KLD Board), Kerala may get some benefit (?)

Pre-independence records reveal that the then Animal Husbandry Commissioner of India Sir Arthur Oliver had advised the British rulers against introducing British breeds into India. Kerala had been importing bulls and "embryos" of elite animals in the past. In 80's expert panel of FAO/ UNEP had observed that cross breeding over 3-4 decades (now 5-6 decades) has not resulted in a wide spread improvement in performance at grassroots level. In many cases cross-breeding has been carried out without initial characterization or evaluation of indigenous breeds and with no effort to conserve local strains. Uncharacterized breeds are disappearing in some rapidly developing regions of the world where climatic, parasitic or disease pressures could have produced important genetically adapted breeds."

With the report of "Mad cow disease" in England and Europe, government of India imposed a ban on import of biomaterial. Even when it is lifted, import can be done only from countries that are declared "free of disease" by the international agency "Office Internationale Epizootie" (O.I.E.). The exporting country should be free from any incidence of Mad Cow Disease for the past 5 years. In the interest of Kerala it is important to verify how the permission from central government was obtained?

The debacle in the milk front is just an early result of misconceptions, long negligence, poor management and wrong prioritization. If all stake holder institutions of animal sector are recognized and roped in as associated institutes of the proposed veterinary university, one can work out a synergy that dovetail research with service for sustainable and holistic development in the best interest of the community.

II

SHORTAGE OF MILK IN KERALA: THE CURRENT PERSPECTIVE

Time has proved that materials or technology lifted from elsewhere can not solve Indian problems. Even within India what is relevant to one State or a region within a State need not be relevant to another. One may consider a "ship to Mouth" policy (ie. bringing milk from out side) only as a temporary relief measure to meet crises. It would be pertinent to discuss the perspective of dairying in Kerala where the land, water and energy sources vary widely.

The work of animal husbandry and veterinary service in Kerala is shared by a number of agencies each of who operate independently without complimenting each other. Decentralization following the 73rd amendment of constitution, had given panchayats the authority of animal resource development in Kerala. But except the state department of animal husbandry all agencies handling animal husbandry are operating independent of panchayat system making a holistic action a far cry.

For example, consider the areas critical to milk production that needs support from government. One reason for the low milk procurement or low production can be the dwindling number of livestock in Kerala which can be due to poor livestock development, under the KLDBoard.

Requirements of Bio-Safety for Milk Production

In developed countries where natural resources are ideal, the major thrust of live-stock production was adopted after most of the contagious and infectious disease had been eradicated by adopting mass slaughter and burial policy. But, import of animals and transport of biomaterials from across the world introduced newer diseases. When animals were imported to India where natural resources are limited and bio-safety is poor, a number of new diseases of livestock and poultry have been introduced.

Certain exotic diseases such as Rift Valley fever, avian influenza (Bird flu) or Bovine spongiform encephalitis (mad cow disease) may pose even greater threat as they affect both livestock and men in India. Since these can be studied only in highly sophisticated laboratories of P3-P5 levels, High security animal disease laboratory etc they are unlikely to be promptly identified till mass deaths precipitate.

Livestock, Environment And Development

Countries like Israel (from where KLD Board claimed to import elite animals) maintain their cattle on a "high input high output" with very high bio-safety. Israel grows animals on succulent grass of good digestibility and on high energy food grains (mainly maze). Adopting the system in India may put animals to compete with man for food. The high input systems need large amount of water, waste disposal measures, sensitive market management and risk prone cutting edge technology. As per US experience, their high input system consumes 2,500 gallons of water to produce 1lb beef and 15,000 litres of water to produce a gallon of milk. Despite possessing large grassland, the U.S.A. is finding it increasingly difficult to dispose animal waste resulting in large nitrogen rich patches in ranches where animals graze (lagoons). Animal wastes have already been identified in drinking water in some states of USA. Animal waste is ranked among the top pollutants in US. 'Spills' is implicated for causing memory loss, confusion, acute skin burning etc. Animal waste dumped to the sea in 10 states alone, have killed more than 13 million fish.

On the contrary, India became the highest milk producer in the world through the endeavor of millions of small holders who rare animals in their backyard essentially on Crop residues (CR) and common property resources (CPR). A steady market by NDDB to milk produced by the unorganized farmers could usher in White revolution in India. India perhaps produces the cheapest milk in the world.

By a modest estimate, Indian cattle and buffaloes produce more than 800 MT (million tons) of fiber rich dung every year. Of this around 300 MT's are burned as dung cakes for cooking energy and the rest is used as manure. Nearly 90% of cooking energy of India's rural areas comes from crop residues and cow dung cake (78%+11.5% respectively). Disposal of animal waste through the cow dung gas plants (human waste can be added to it) is low in "water use". But operational problem varying from region to region and season to season need be seriously addressed.

Land, Water and Energy in Kerala

It is pertinent to verify if Kerala has the land, water and energy to produce feed for the elite cows before funds (be it Central government fund or State fund) are wasted for yet another import. We know fully well that in the past import has not produced any positive impact. The land availability of Kerala is low. A book entitled the "Natural resources of Kerala" published by WWF (Kerala state office) shows that the per capita land holding of Kerala is 0.13 hectare and per capita cultivable land is 0.1 hectare. The cropping percentage of Kerala is 125 (%). Water is plenty during monsoon; but is wasted into the sea and washes off minerals, depleting the soil. Concrete drain along with sand mining and land filling has destroyed many water holes that retained soil water content and reduced the loss of precious water needed for summer days. During the dry spell between January and May even a blade of grass is hard to get in many parts of Kerala especially in Trivandrum district, where MILMA's first symptoms of milk crisis was seen.

We may discuss whether western system of grain based animal production where our animals may compete with man for food grains is adoptable? The cost of cattle feed and oil cakes in the state are much higher than the cost of rice especially the one from our ration shops (the BPL rice costs only a fraction of the cost of cattle feed). Can we overrule the low cost rice being used as animal feed by frustrated farmers (?) Civil supplies minister who happens to be the minister for Animal husbandry may not concern himself with animal feed. But can he ignore the possibility of misuse of ration where majority of cattle owners are landless or are small holders.

In normal course, it would be difficult to raise cattle with an average daily milk yield of 60 litres in Kerala. According to a known animal nutritionist in Kerala late Dr. Kuruvilla Verghese, the type of grass available in Kerala by and large is of poor quality (it is because of impoverished soil and peculiar climate). We may not be able to (economically) maintain animals yielding more than 15 Kg milk daily. Exces-

sive feeding of poor quality grass or use of large quantity of concentrates (prepared feed, oil cake etc.) to compensate for the grass of poor quality, can impair digestion in rumen (the fore-stomach of cattle where fermentation of fodder takes place) and impair the papillae formation (projections inside the wall of rumen). (Energy available from roughage is expressed as Qm ie. Metabilizable energy/ Gross Energy; normally this has to be <1. Materials with Qm =>0.9 is good and is used as human food. Materials with Qm = 0.2 is poor. Grass generally available in Kerala has Qm value less than 0.2)

Papillae provide additional surface area for microflora, present naturally in the rumen, to lodge and function. Management of calves in the first 12 months is important. Calves can be allowed access to small quantities of grass right from second week of birth to enhance salivation, which in turn will help the development of papilla. It is seen that poor management in young age can reduce the production by 30% in spite of good management during later part of (productive) life. Calf starters (special calf feed) is very important for early growth and optimal expression of the genetic qualities of the calf. Growth of calf is also influenced by care of its Mother (dam) during pregnancy.

"An adult animal should ruminate at least for 8 hours a day" says Dr. Kuruvilla. Wrong feeding can exhaust the rumen, reduce pH (cause acidity) and decrease the efficacy of digestion (digestibility) by 63% to 50%. Rumen functions optimally when pH of stomach is maintained between 6.27 and 6.3. Studies reveal that 80% of the dairy cattle in Kerala have rumen pH 6.2 or less. So, individual success stories with high yielding animals in Kerala may not be generalizable.

"..getting one calf a year is essential for economic dairy farming. [infertility is frequent in Kerala]. According to Dr Kuruvilla Verghese nearly 50% of the infertility is due to energy deficiency; 25-30% is caused by mineral deficiency. (essentially manganese, cobalt and zinc) Minerals must be available in a form that is absorbable by animal." Data also indicate that nearly 28% of the infertility may be related to wrong Artificial Insemination (A.I.) by untrained persons.

III
SOME POSSIBLE REMEDIES

It would be unfair to close the note without suggesting some possible remedial measures. There is need to clarify role of MILMA an organization of public importance. Even though the Kumbashree system introduced in marketing banana & vegetable cultivation had taken the cue from milk unions and "Grameen bank' of Bangladesh, it surely has a good impact and better participation than Milk unions. However, the Kudumbashree' institutions have obligation only to the farmer and not to the customer community. However, a unique role being played by MILMA in controlling the milk market need be recognised. The Kudumbashree's institutions do not handle processing; but their over head is more direct and stays around 2-5%. The entire (selling) price is given to the producer. Kudumbashree is only in its primary phase of development and they may learn from MILMA's experience (and crisis) for their future functioning. It is not impossible to work out a good combination for a sustainable mission mode (turn key) program using good management tools like PERT, CPM or Gantt chart after a proper work break down study. I am discussing some possible action plans.

The constraints before the dairy farmers are mainly five (a) lack of dependable and economic feed ie. Oil cakes, grains and compounded feed (b) lack of green and dry fodder, especially from December to June (most acute from January to May) (c) the deadly Foot and mouth disease (FMD) and mastitis, a disease that damage udder (d) infertility or delayed maturity that deny one calf per year (e) absence of transparent functioning of milk unions and assuring a fair marketing opportunity and moderate income.

1. As per a raw data Kerala has nearly 70 lakh (L) families, of this nearly 30 lakhs keep animals (16 L keep poultry; 8L keep goats; 8L keep cows; 2L keep both cattle and goats). Even if each dairy owning family produces 10-15 Litres of milk per day all families of Kerala may get 1 to 1.5 Litres milk. India's status as the highest milk producer indicates that a Low input– low output system for milk production is not impossible.

2. Individual success stories of "High input high output regimen" can not be generalized though individual (private) efforts to generate congenial situation for futuristic hi-tech dairy should not be discouraged. MILMA do not collect milk from such private dairy farmers, though NDDB is a staunch advocate of privatization.

3. So far as MILMA is concerned, the organisation must try to be self sufficient and its milk unions be made transparent in their dealing. MILMA can generate a reserve fund to tide over any crisis like the one it is facing now. One way to generate more funds is to diversify. Producing purified water, providing space for advertisement in milk pouches. Producing "MILMA rich" or new products must be encouraged. But such market strategies may have to be worked out during flush season when road blocks are minimal.

4. There has to be a review of the working of all milk unions and co-operatives. The members and the executive bodies must be actual animal/ dairy owners. Public men who deal with politics are likely to elicit criticism of political favoritism and subjective actions.

5. It is important to make the milk collection transparent and simple. Each producer who sells milk must be able to see for him or herself the evaluation and pricing. Producers should be encouraged to take turns to attend the collection, evaluation of milk and distribution of inputs. Many dairy owners hesitate to join, as milk unions lack transparency and fear that pricing may be used against them if they ask for an open dealing. Many also feel that dubious evaluation can be used by leaders to perpetuate their position in milk unions.

6. The major hindrances to economic dairy farming are feeding and health care. There has to be a provision to supply all the feed materials like oil cakes, green fodder and dry fodder (ie. paddy straw) directly to farmer as per need over and above compounded feed. Many farmers feel that they are made to wait for hours for the supply of green fodder if at all. But common dairy owner is afraid to speak out. There has to be a more efficient system evolved after a discussion and consensus. This system must be reviewed from time to time. The department of Animal husbandry of Kerala is currently addressing the threat of Foot & Mouth Disease even though it is done at the cost of other duties and development activities bestowed on them.

7. To encourage more collection, dairy owners must be given freedom to receive total payment in cash or in kind as feed material of her/ his choice. (paddy straw, green fodder, oil cake, rice bran, mineral mixture, calf starter etc.). With use of data base, producers' requirement can be estimated and supplied in time.

8. Fungal poisoning in the prepared feed is frequent (aflatoxicosis). Though not always lethal, this toxin reduces milk yield drastically. There has to be a lab in each district where the common man can take the feed for primary testing (it is called proximate analysis). This can be on a chargeable basis, but must be quick and include analysis of any feed material, either from government or private suppliers (both branded and unbranded). Even though one may not go for litigation each time, one may be able to discontinue the use of sub-standard or toxic feed, and discuss the matter in the community to expose/ boycott erring agencies.

9. Feed and fodder suitable for the soil of different regions of Kerala need be identified. Effort should be made to use government / panchayat land (surplus land?) for cultivation of suitable fodder varieties to be sold to dairy owners who supply milk to MILMA. Efforts like Ayalkoottam/ kudumbashree/ Janashree etc. could identify common property, water and energy (&man power). Long ago contour bunds, and bunds around coconut plantations used to be used for Napier grass cultivation. Possibility of rejuvenation of rubber and tea estates using low yielding animals and using their dung as manure is another possible synergy.

10. If the proposed Veterinary University of Kerala can be organised by pooling the resources of all the institutions and corporations who has stake in Animal resource development, it can work for converging resources and a synergy of service.

Departments of the veterinary university can take up tasks to solve the problems of farmers in animal rearing, animal marketing, feed production, product collection, product safety and product processing. They can organize their research base in farms or institutions of each region. Divisions like Livestock Production and management, breeding, nutrition, epidemiology, extension must be directed to pursue problems of public importance in their post graduate (PG) program and training. Resources for pedagogic training and research must involve not only the large government farms and processing plants, but also the back yards of the animal rearing common man.

11. During summer, when milk is in short supply, there could be a ban on sale of milk based sweets. MILMA can save on transport if they collect milk from private dairy farms of Kerala open. If the collection is transparent it would be better than buying milk powder from other states and distributing reconstituted milk.

12. Government can provide a revolving fund to MILMA to meet any eventuality or crisis? In due course MILMA can raise its own reserves and repay this fund.

Veterinary universities must also be assigned the task to study holistically Family life style in Kerala, their food needs, special needs of dairy owning families, man power availability, any good technique they use, sustainable animal Housing and hygienic disposal of wastes using local material. Apart from developing protocols for hygienic production of food and utilities of animal origin, they may regularly study the Milk required in each district of Kerala (normal, season-wise, during festivities or in crisis like flood, draught and landslides). Students and scholars must visit organized and unorganized milk markets, study collection, sale of animals and their bye-products. They may study the economics of the Live-stock marketing, market trends and the role of intermediaries. They may study on the current use of land, water and energy for animal husbandry, and evolve (observe, select or adopt) methods to ensure optimal use of the land, water and energy. new products for marketing, low energy implements (eg: non-electric milking machine presented in Kerala science congress).

It is high time that management skill and technical knowledge is merged at decision making forums. The role identification of each unit of animal resource development is essential to prevent duplication and overlapping and for the optimal use of resources.

Author

Prof.(Dr.) Rama Kumar V., Former Secretary, Veterinary Council of India

Retd Professor of Surgery

Phone: 0471-2320773 – Mobile: 9847443086

ramkumarjaya@rediff.com; drramakumarv@gmail.com

JIVA, 6(2):2008

EFFICACY OF DIFFERENT THERAPEUTIC PROTOCOLS TO IMPROVE FERTILITY IN REPEAT BREEDING CROSSBRED COWS*

R.S.Abhilash, A.Seshagiri Rao, K. Mouli Krishna, K.Venugopal Naidu and R. V. Suresh kumar

Repeat breeding is the most commonly encountered but poorly understood condition in cattle leading to reproductive failure. Delayed ovulation and early embryonic death are two important causes of repeat breeding. Various hormonal treatments have been used to improve pregnancy rate in repeat breeding cattle. Both GnRH and hCG can effectively synchronize the duration of oestrus, ovulation time and thereby increase the conception rate (Goley and Kadu, 1995 and Kaltenbatch *et al.*, 1998). Administration of progesterone on the fifth day of oestrus was found to bring an improvement in progestational status of cows and improve conception by preventing early embryonic death (Devanathan and Pattabhiraman, 1997). In the present study effect of different therapeutic protocols on duration of oestrus, ovulation time and conception rate were studied.

Materials and Methods

A study was conducted on eighty repeat breeding crossbred cows presented to Veterinary Hospitals in and around Tirupati, Chittoor district of Andhra Pradesh, during the period from December 2002 to May 2003. All the animals selected for the study were with the history of failure of conception even after three or more consecutive inseminations. The animals selected were free from gross palpable anatomical defects, pathological defects and infections. Subclinical endometritis was ruled out by conducting white side test (Pateria and Rawal, 1990). Later on, the pattern of oestrous cycle was studied for one cycle and then the animals were subjected to treatment.

Based on oestrus checks at 8 hour intervals, duration of oestrus was calculated as the period extending from 4 hours before the onset to 4 hours after the last observation of standing for mounting (Tanabe et al., 1994). Duration of oestrus was categorized into less than 24 hours, 24-36 hours and beyond 36 hours. Ovulation time was observed based on the rectal examination at 8 hour intervals. Time of ovulation was considered to be the mid point between the last two examinations at which the follicle was present and then found ruptured (Tanabe et al., loc.cit.). Ovulation was confirmed by noting the developed corpus luteum at the site of ruptured follicle 8-12 days post ovulation. Time taken for ovulation was classified into less than 16 hours (normal ovulation), 16-48 hours (delayed ovulation) and more than 48 hours (failure to ovulate) after the cessation of oestrus signs. The animals were divided randomly into 4 groups, consisting of 20 cows in each group (3 treatment groups and one untreated control group) and treated as given below and inseminated with good quality frozen semen.

Group I: 20 µg GnRH intramuscularly after detection of oestrus and inseminated 6 hours later.

Group II: Chorulon 1500 IU immediately after detection of oestrus and inseminated 6 hours later.

Group III: 500 mg of progesterone intramuscularly on fifth day post insemination.

Group IV: 5ml of normal saline was injected immediately after detection of oestrus and inseminated 6 hours later.

All the four groups of animals were observed for duration of oestrus and time of ovulation on the same cycle. The animals which failed to conceive were subjected to second insemination without any treatment. All the non-return animals from all four groups were subjected to pregnancy diagnosis after 60-90 days of last insemination.

Results and discussion

The results are summarized in the Table. There was a marked increase in groups I and II after treatment, in the number of animals that showed duration of oestrus less than 24 hours and that which ovulated less than 16 hours after the end of oestrus. Groups III and IV showed no change after treatment, since no treatment was adopted in these groups on day zero. This showed that GnRH and hCG reduced duration of oestrus to a period with in 24 hours and the ovulation time to less than 16 hours, which is in agreement with the findings of Goley and Kadu (1995) and Kaltenbatch et al. (1998).

Table. *Effect of different treatments on duration of oestrus, ovulation time and conception rate in repeat breeding crossbred cows (Figures in parentheses indicate the number of observations)*

Parameters		Percent of animals			
		Group I GnRH on day0 (n=20)	Group II hCG on day 0 (n=20)	Group III Progesterone on day 5 (n=20)	Group IV Control (n=20)
Duration of oestrus					
< 24	Before treatment	40(8)	45(9)	50(10)	40(8)
	After treatment	75(15)	85(17)	50(10)	45(9)
24-36 hrs	Before treatment	35(7)	35(8)	25(5)	30(6)
	After treatment	20(4)	15(3)	30(6)	25(5)
> 36 hrs	Before treatment	25(5)	20(3)	25(5)	30(6)
	After treatment	5(1)	0	20(4)	30(6)
Ovulation time					
< 16 hrs	Before treatment	35(7)	45(9)	40(8)	45(9)
	After treatment	80(16)	85(17)	45(9)	45(9)
16-48 hrs	Before treatment	45(9)	40(8)	40(8)	30(6)
	After treatment	20(4)	15(3)	40(8)	35(7)
> 48 hrs	Before treatment	20(4)	15(3)	20(4)	25(5)
	After treatment	0	0	15(3)	20(4)
Conception rate					
I^{st} insemination		45(9)	60(12)	35(7)	10(2)
II^{nd} insemination		9(1)	12(1)	15(2)	11(2)
Overall		50(10)	65(13)	45(9)	20(4)

An improved conception rate (50 Vs 20) was observed in the repeat breeding crossbred cows when GnRH was administered close to the onset of oestrus coupled with late insemination. The result was in agreement with the findings of Stevenson et al., (1988), who observed that administration of GnRH analogue close to the onset of oestrus in repeat breeding crossbred cows might have induced an early preovulatory surge release of LH, which in turn terminated the maturation of oocyte and caused the ovulation with in normal range of time. The GnRH has also the capacity to elicit the synchronization of ovulation by initiating PGF2 á-pulses. This in turn leads to stimulation of fibroblast to secrete collagenase, which collapses the thecal matrix of collagen and leads to ovulation (Ryan et al., 1991).

An improved conception rate was observed with the administration of hCG (65 Vs 20) close to the onset of oestrus coupled with late insemination. It was established that the hCG with more LH like activity for a prolonged period, when administrated close to the onset of oestrus induced an early and direct preovulatory LH surge, which in turn matured the follicle and decreased the variation about the average ovulation time, resulting in synchronization of ovulation with in normal time. The continuous action of hCG due to its long half life resulted in more proliferation and differentiation of luteal tissue by recruiting more granulosa cells (Babler and Hoffman, 1974).

An improved conception rate (45 Vs 20) was observed with the administration of progesterone on the fifth day of insemination in repeat breeding crossbred cows. The result was in agreement with the findings of Devanathan and Pattabhiraman, (1997) who reported that administration of progesterone on fifth day post insemination will improve the progestational status of cow and improved the conception rate.

Summary

This experiment was conducted to study the effect of different therapeutic protocols on duration of oestrus, ovulation time and conception rate. In the present study Group I and Group II animals were treated with GnRh and hCG immediately after the detection of oestrus and inseminated six hours later and Group III animals were treated with progesterone on fifth day post insemination. It was found that both GnRH and hCG can effectively synchronize the duration of oestrus and ovulation time with in the normal range. An improved conception rate in repeat breeders was observed with the treatment of GnRH (50%), hCG (65%) and progesterone (45%) when compared to the control group (20%)

References

1. Babler, C. D. and Hoffman, W. F. (1974), J. of Dairy Science 57 (5): 627.
2. Devanathan, T. G. and Pattabhiraman S R (1997), Indian Vet. J. 74: 483
3. Goley, R. R. and Kadu, M. S.(1995), ibid 72: 472.
4. Kaltenbatch, C. C., Dunn, T. G., Kiser, T. E., Corah, L. R., Akbar, A. M. and Niswender, G. D. (1998), J. of Anim. Sci., 38: 357
5. Pateria A K and Rawal C V S (1990), Indian J. of Anim. Repr. 11 (2): 142
6. Ryan D P, Kopel E, Boland M P and Godke R A (1991), Theriogenology 36(3)367
7. Stevenson, J. S., Frantz, K. D. and Cell, E. P. 1988, Ibid 29 (2): 455
8. Tanabe, T. Y., Deaver, D. R. and Hawk, H. W. (1994), J. of Anim. Sci., 72:719

Author

* Part of M. V. Sc thesis submitted to Acharya NG Ranga Agricultural University, Hyderabad by the first author.
1. Veterinary Surgeon, Calf Feed Subsidy Scheme, Kottarakkara Circle, Kollam
2. Associate Dean, NTR College of Veterinary and Animal Sciences, Gannavaram
3. Assistant professor, Department of Animal Reproduction and Gynaecology, Tirupati
4. Professor and Head, Department of Animal Reproduction and Gynaecology, Tirupati
5. Assistant professor, Department of Surgery and Radiology, Tirupati

JIVA, 6(2):2008

PREVALENCE OF AMPHISTOMOSIS IN VALLIKKUNNU PANCHAYAT AND ITS LIKELY IMPACT ON MILK PRODUCTION

Prasad A and Bipin K.C

Introduction

In most cattle-producing areas of the world, infestation by helminth parasites (particularly gastrointestinal nematodes) is considered to be a primary cause of production loss. Among the parasitic infections of dairy cattle, amphistomosis found to be one of the major problems affecting cattle health and production. Apart from production loss, it also contributes to reduction in quality of milk. A project was undertaken at Vallikunnu Panchayat of Malappuram District to collect specific scientific data on the impact of Amphistomosis on the quantity and quality of milk in dairy cattle. In the present study, which is a part of the project funded by the department of Animal Husbandry, Kerala, areas of high prevalence of amphistome infestation were identified. Morning milk production, SNF, Total solids and fat percentage of 221 animals were examined. Also California mastitis test were conducted.

Materials and methods

The study was conducted during the pre-monsoon period (from 20-04-2007 to 17-05-2007). Fresh dung samples and milk samples from all the four quarters were collected from randomly selected dairy cattle from all the 22 wards of the Panchayath. All the dung samples were screened for presence of Amphistome egg by direct microscopic examination after concentration by centrifugation. Animals were grouped based on the presence and absence of amphistome egg in the dung sample. Fat percentage of milk samples were estimated by Gerber's method. From the fat percentage and corrected lactometer reading, solids not fat (SNF) and Total solids (TS) were estimated. California Mastitis Test (CMT) was performed on all milk samples. Milk samples from the four quarters of each animal were the pooled and Lactometer reading was noted.

Results

Out of 221 dung samples screened for presence of Amphistome egg, 92 samples found positive. A high prevalence of Amphistomosis was observed (41.63%) in Valikkunnu Panchayath. The ward wise distribution of positive cases is given in Table 1. The schematic representation of prevalence of Amphistomosis in Vallikkunnu Panchayath is plotted in Figure 1.

The mean morning milk yield, lactometer reading, milk fat percentage, total solids and SNF of Amphistome positive and negative cases are given in Table 2. The mean morning milk yield of Amphistome positive and negative animals were 3.56 and 3.69 litres respectively. Most of the animals in both groups were under semi intensive system of rearing. The mean fat percentage of both Amphistome positive and negative groups was 3.13%. No difference in average fat percentage of milk due to Amphistomosis was noticed. But average Total Solids percentage in Amphistome positive samples was 11.57 where as in that of negative samples was 12.01. The SNF percentage in positive and negative groups was 8.48% and 8.88% respectively. The average morning milk yield, fat percentage, total solids and SNF were given in Figure 2.

The samples from each quarter were subjected to CMT and results were noticed. Higher percentage of sub clinical mastitis was noticed among animals of Amphistome negative group (7.52%) against positive group (4.35%).

Figure 1. The areas where Amphistomosis cases noticed is plotted against geographical land forms of Vallikkunnu Panchayath

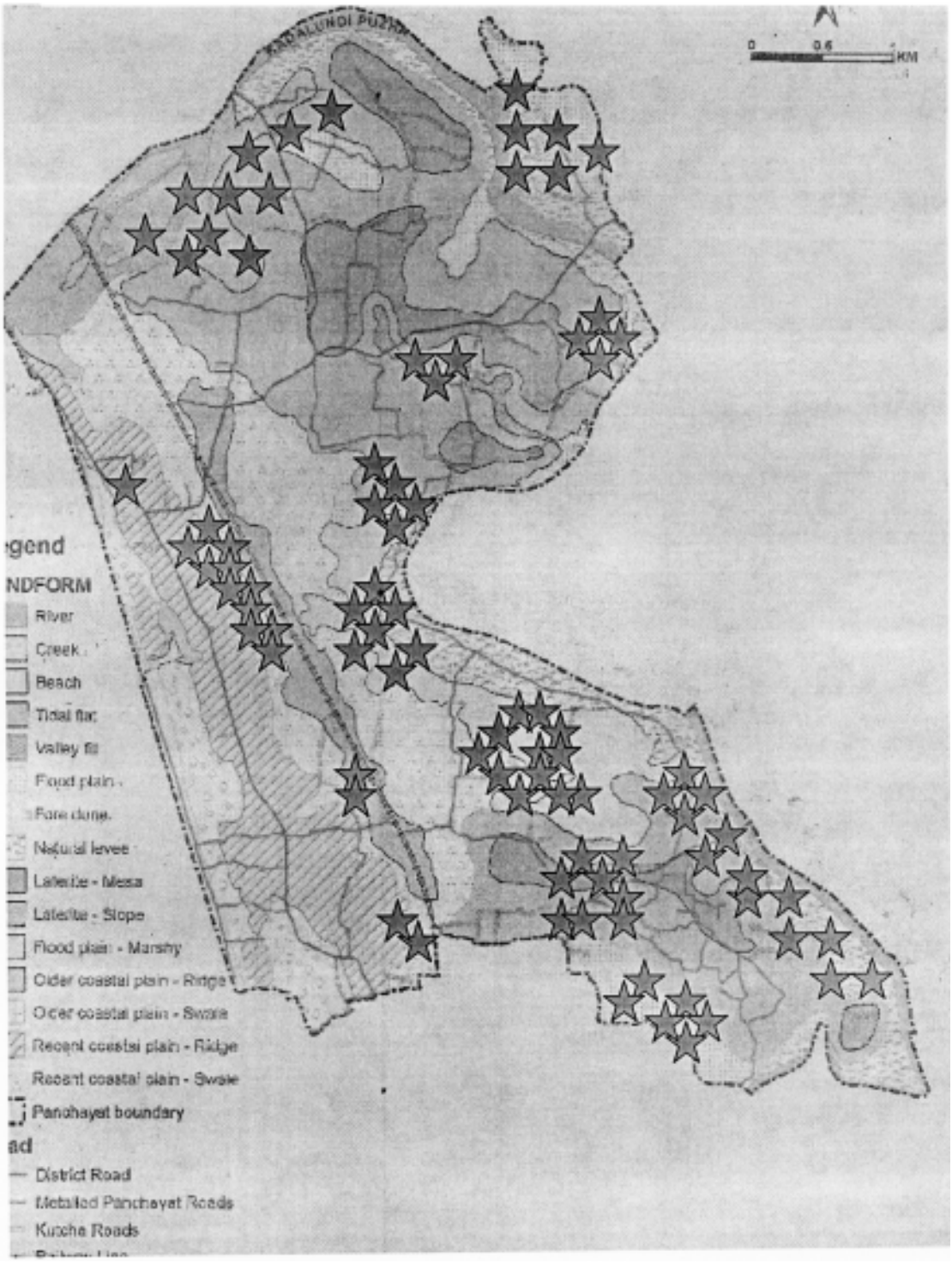


Figure 2: The average morning milk yield, Lactometer Reading, Fat Percentage, Total Solids and SNF in both Amphistome positive and negative groups.

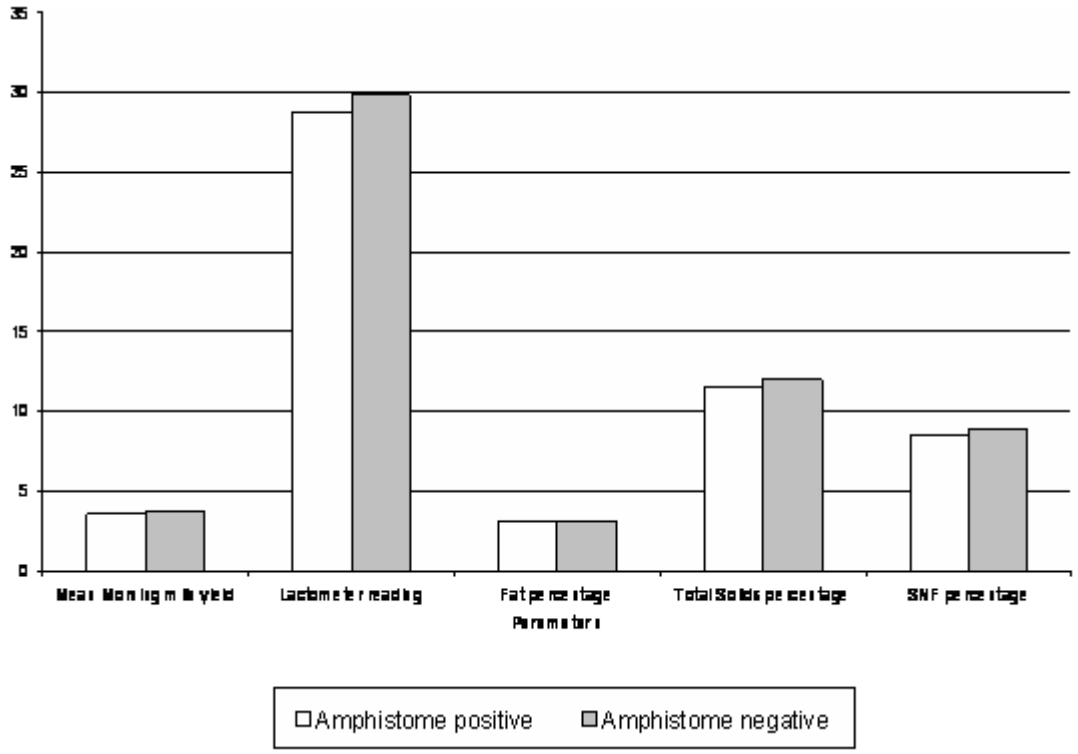


Table 1: Ward wise distribution of Amphistome positive cases in Vallikkunnu Panchayath

Ward	No. of positive samples	Ward	No. of positive samples	Ward	No. of positive samples
1	0	8	6	15	10
2	0	9	4	16	2
3	0	10	5	17	2
4	9	11	7	18	1
5	0	12	13	19	11
6	0	13	6	20	0
7	0	14	7	21	0

Table 2: The mean morning milk yield, lactometer reading, milk fat percentage, total solids and SNF of Amphistome positive and negative cases

Parameter	Mean value in Amphistome positive group	Mean value in Amphistome negative group
Mean Morning milk yield	3.56	3.69
Lactometer reading	28.76	29.84
Fat percentage	3.13	3.13
Total Solids percentage	11.57	12.01
SNF percentage	8.48	8.88

Discussion

Prevalence of Amphistomosis in Vallikkunnu Panchayath was observed to be 41.63% in the present study which is considered to be very high and needs quick intervention. Various control measures including chemotherapy, biological control, control of intermediate hosts and sanitary measures must be considered. Prevalence of Amphistomosis was observed to be high in banks of marshy, flood plains of the Panchayath. Control measures are to be concentrated in these areas.

Average morning milk yield was affected by 0.11 litres due to Amphistomosis. High percentage of sub clinical mastitis among the negative group might have reduced the difference in average morning milk yield between the groups. It is also observed that Amphistomosis did not significantly affect the fat percentage of milk. This could be due the fact that these animals were maintained in different plane of nutrition and under the management of different individual households. But the percentage of SNF and Total solids were significantly affected by Amphistome infestation.

Reference

1. Bliss, D. H., and A. C. Todd. (1974) Milk production by Wisconsin dairy cattle after deworming with thiabendazole, Vet. Med. Small Anita. Clin. 69:638.

2. Rolfe PF, Boray JC, Nichols P, Collins GH(1991) Epidemiology of paramphistomosis in cattle. Int. J. Parasitol. Nov;21(7):813-9.

Authors

1. Dr.Prasad A., Veterinary Surgeon, Veterinary Dispensary, Ariyallur

2. Dr.Bipin K.C, Veterinary Surgeon, Clinical Laboratory, Malappuram

JIVA, 6(2):2008

DESIGNER EGG-POWER PACKED WITH NUTRIENTS AND BENEFITS

Lonkar V.D., John Abraham and Balusami C.

Introduction

Designer foods are one of the hottest topics in the food and health industries today. The design of foods to take advantage of preventive and therapeutic properties of nutrients represents a critical step in the successful food supply for the improvement of consumer health. Consumers are more health conscious and determined to take control of their own lifestyle through nutrition and exercise. Recently, scientists have been working on genetic modification to design or produce eggs from chicken that contains special proteins which are capable of preventing cancerous cells in human body.

Currently the focus is on unique components in egg and the ways to capitalize their potential for healthy applications; and for industrial uses which is presently geared in the production of designer eggs. Now extra nutrients and non-nutrients like active herbal principles are incorporated in the eggs.

Omega 3 fatty acids (PUFA)

Omega-3 fatty acids are considered essential fatty acids. They are essential to human health but cannot be manufactured by the body. For this reason, omega-3 fatty acids must be obtained from food. They are also known as polyunsaturated fatty acid (PUFA). Omega-3 fatty acids play a crucial role in brain function as well as normal growth and development. There are three major types of omega 3 fatty acids that are ingested in foods and used by the body: Alpha-Linolenic Acid (ALA), Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid (DHA). The Greenland Eskimos consuming seal based fat rich diet, which is rich in omega 3 fatty acids, has the lowest mortality for Cardio Vascular Disease, has generated much interest on health benefit of omega 3 fatty acids.

On incorporating flaxseed (linseed), rape seed (mustard), marine algae, pearl millet, soya bean, safflower oil, fishes like sardine, salmon etc. in the hen's diet, the omega-3 fatty acid content of yolk increases at the expense of the unfavorable saturated fatty acids like palmitic and stearic acid. A designer egg will supply about 50% of daily requirement of omega 3 (PUFA) without any change in sensory quality of egg. Consumption of omega 3 fatty acid enriched eggs produced changes in the serum and platelet lipid composition of human beings. It acts as an alternative to mother's milk for preterm and orphan babies and improves immunity.

Polyclonal Antibodies (IgY)

Chicken egg is abundant in antibodies like "IgY" which is cheaper and better than mammalian immunoglobulin "IgG". A hen produces about 298 mg of specific antibodies in a six week period, compared with only 17 mg from a rabbit. This "IgY" can be used to treat human rotavirus, E. coli, Streptococcus, Pseudomonas, Staphylococcus and Salmonella infections. Antibody - "IgY", other natural antimicrobials and immunostimulants in eggs, prolong life of AIDS patients, by their high nutritional value, as well as immunostimulant and anti-viral properties.

The "IgY" level in the egg can be increased by dietary manipulations. The functional feed rich in omega-3 fatty acid and anti-oxidants itself will increase "IgY" level in the egg. Herbal supplementation will further boost "IgY" level in the egg. Among the herbs, Tulsi leaves at a dietary level 0.3-0.5 % has been found to have highest ability to boost "IgY" level in the egg. Chicken egg yolk antibodies can be administered orally for passive immunization against infection in infants and young animals. The application of "IgY" technology to human medicine may be either by ingestion of pure "IgY" or by encapsulation of an egg yolk concentration so that "IgY" is not destroyed by the acidity in the stomach.

Genetic modification

Biotechnology is being used to develop genetically modified chickens that produce compounds that can be harvested from eggs like insulin for the treatment of diabetes. Scientists of United Kingdom have developed genetically modified chickens capable of laying eggs containing proteins needed to make cancer fighting drugs. According to Japanese researches, Lumiflavin and Lumichrome substances present in eggs are capable of preventing multiplication of cancer inducing viruses and also prevent normal cell turning into cancerous cell.

Hen, like all other animals, produces antibodies to neutralize the antigens (viruses, bacteria, etc.) to which they are exposed to each day. These antibodies circulate throughout the body and are transferred to eggs as a mode of protection to the developing chick. Immunologists are taking advantage of the fact that the hen can develop antibodies against a large array of antigens and concentrate them in the egg. Specific antigens are now being selected and injected into the hen that develops antibodies against them. As new knowledge is gained in the area of biotechnology, designer eggs in future may be produced that result in a range of antibodies even against snake venom.

Herbal enrichment

Incorporation of herbal plants and products in the diet of layer reduces cholesterol in egg. Tulsi, fenugreek and spirulina in functional layer mash with flax seed and fish oil is found to reduce total cholesterol by 29%. Herbs like rosemary, turmeric, garlic, neem, fenugreek, spirulina, ashwagandha etc. also possess immunomodulating properties.

Onion, garlic and neem are found to be effective as hypocholesterolaemic agents. Dietary supplementation of garlic and neem in poultry has been found to reduce cholesterol level in egg. These herbal plants contain active principles like organosulphur compounds which are responsible for hypocholesterolaemic effect.

Minerals

The dietary supplementation of selenium, iodine and chromium in layer ration has been found to increase their levels in egg. Dietary supplementation of selenium decreases cancer mortality by two fold in humans. Chromium decreases egg cholesterol and improves egg interior quality. Recent studies showed that enrichment of iron in the egg could be effectively achieved by supplementation of iron-methionine chelate at the level of 100 ppm iron for 15 days.

Pigments

Egg yolk provides an excellent, highly bioavailable source of carotenoids, lutein and zeaxanthin pigments. Recent research demonstrated the link between these dietary compounds and the macular pigment of retina of eye. Lutein and zeaxanthin are primary carotenoids found in the macular region. Sufficient quantities of these nutrients in the diet are thought to decrease the age related macular degeneration, a leading cause of blindness in the elderly. Normal egg contains 0.5mg of carotenoids and it can be increased to 4-5 mg/egg. Natural sources like yellow maize, alfalfa, corn glutein meal, marigold petal meal, blue green algae called spirulina, capsicum etc. will impart rich colour to the egg yolk by transferring the pigments.

Conclusion

Now-a-days consumer is ready to pay a premium price for designer products that are safe and which improve their health due to the presence of special health promoting components. Eggs with modified fat content have become very popular and are available in countries like U.S. Eggs with modified fat content eggs are marketed as that containing less cholesterol, less saturated fat, higher amounts of omega-3 fatty acids, higher vitamin E content and high amounts of iodine. Many omega-3 fatty acid-enhanced eggs are available in the U.S. market under various brand names such as Gold Circle Farms, Egg Plus, and the Country Hen Better Eggs.

References

1. Farrell, D.J. (1998). Enrichment of hen eggs with n-3 long chain fatty acids and evaluation of enriched eggs in humans. *American J. Clin. Nutr.* 68: 538-544
2. Handelman, G.J. Nightingale, Z. D., Lichenstein, A. H., Schaefer, F. J. and Blumberg, J. (1999). Lutein and Zeaxanthin concentrations in plasma after dietary supplementation with egg yolk. *American J. of Clin. Nutr.* 70:247-251.
3. Hasler, C.M. (2002). The changing face of functional foods. *J. American College of Nutr*. 19: 499S-506S.
4. Narhari, D. (2005). Nutritional manipulations for value added egg and meat production. Proceedings of XXIII IPSACON, 2-4 February, 2005. Souvenir and lead papers, Hyderabad. pp. 85-91.
5. Pritchard, S. (2003) Functional food-an apportunity for eggs. *Poultry International*. 42(10): 48-51.
6. Tizard, I.R. (2000) Veterinary Immunology: An Introduction, 6th Edn. WB Saunders company, Philadelphia. Pp.442-444.

Authors

1. Dr.Lonkar V.D., Teaching Assistant, Dept. of L.P.M, Veterinary College, Wayanad
2. Dr.John Abrahm, Assistant Professor, Dept. of L.P.M.
3. Dr.Balusami C., Assistant Professor, Dept. of L.P.M.

CANINE CANCER CHEMOTHERAPY –AN OVERVIEW

Nisha.A.R

The shift of 'pets' to 'companions' increases the life span of canines and thereby chances of diseases like cancer. Cancer is an abnormal growth of cells which tend to proliferate in an uncontrolled way; and in some cases show metastasis destroying healthy tissues. It is a leading cause of death in dogs and cats. Dogs develop cancer twice as frequently as humans, but cats only half as frequently. The signs of cancer range from an abnormal swelling that persists or continues to grow, a sore that does not heal, weight loss, bleeding or discharge from any body opening, reluctance to exercise, a loss of stamina or difficulty in breathing, urination or defecation.

Benign tumours have many common characteristics. They do not spread or invade organs. They compress nearby body organs due to their size. Surgical removal is curative. Malignant tumours show rapid irregular growth. These tumours can invade normal, local tissues as well as spread to other tissues. Remission denotes a decrease in tumour size over a period of time. Remission time is the duration of time in which the tumour is under control. The treatment of cancer in animals can often result in fairly long remission times.

Diagnosis can be done by biopsy, imaging techniques, and CT scans. Biopsy is the surgical removal of a small piece of tissue and its examination under microscope. An aspiration can also be made by a needle attached to the syringe for microscopic analysis. Tumours are assigned to high, intermediate and low grades based on microscopic evaluation, radiography using positive or negative contrast (iodinated agents), ultrasound, X-ray, Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and Nuclear Scintigraphy. A CT scan or an MRI may elucidate a brain tumour that would not be apparent on skull radiographs.

Breed susceptibility

The incidence and type of tumour is related to breed and probably controlled by single or multiple genes. Specific tumours with high breed risks are

1) Benign mammary tumour- Basset Hound, Poodle, York Shire Terrier, Chihuahua, Maltese
2) Malignant mammary tumour- English Setter, Chihuahua, Poodle, Afghan Hound
3) Multiple dermal fibroma, Renal cystadenocarcinoma, Uterine leiomyoma- German shepherd
4) Trichoepithelioma- Basset Hound
5) Pilomaticoma- Kerry Blue Terrier
6) Anal sac gland carcinoma- English Cocker Spaniel
7) Subungual squamous cell carcinoma: Giant Schnauzer and Gordon Setter
8) Subungual malignant melanoma: Scottish Terrier
9) Melanocytoma: Vizsla and Miniature Schnauzer
10) Liposarcoma: Shetland sheepdog
11) Mast cell tumor: Boxer and Pug
12) Cutaneous plasmacytoma: Cocker Spaniel

Cancer –the Line of Treatment

There are three ways to treat cancer-surgery, radiography and chemotherapy

Surgery: Surgical removal of tumor is a very common and valuable approach for solid tissue tumors. It can be used for soft tissue as well as for bone tumors.

Radiotherapy: Radiation therapy consists of the use of a radioactive beam to damage and/or kill malignant cells in a localized area. It can offer good

quality remission times for many types of tumors, but usually do not give a complete cure. Animals are surprisingly tolerant to radiation therapy

Chemotherapy: It is the use of certain drugs alone, or in combination with surgery/ radiotherapy, to control tumour growth. All the drugs currently given to animals are human anti-cancer drugs. Fortunately, many of the negative consequences of their use in human medicine are not experienced in veterinary medicine. Chemotherapy and/or surgery are the two most important treatment modalities in veterinary cancer medicine. A combination of therapies may also be indicated in certain cancers.

Combination therapy in animals

The decision to use antineoplastic chemotherapy in animals depends on several factors such as type of tumour, stage of malignancy, condition of animal and financial constraints. Chemotherapy is generally used as an adjunct to surgery or irradiation. In most of the cases neoplastic burden is initially reduced either by surgery or irradiation followed by chemotherapy. In many cases chemotherapy may also be used as primary treatment especially when neoplasms are disseminated and not amenable to surgery or irradiation. Due to low therapeutic index of antineoplastic drugs, the protocols of various combination dosages in veterinary medicine are generally designed to cause minimal toxicity to patients and are calculated based on body surface area rather than body mass.

Surface area in square meters = Body weight $^{0.67}$ x K/10^4, when body weight is given in grams. For dogs and cats K is constant with value of 10.0 and 10.1 respectively

The Scope Of Chemotherapy

Chemotherapy is the name given to cancer treatment using cytotoxic chemical agents. Cytotoxic agents kill cells. Unfortunately it kills all cells, both cancer and healthy cells. However, the particular chemicals chosen tend to be more toxic to cancer cells than they are to normal cells. The duration of chemotherapy depends on the type of cancer and the extent of disease. Some animals need chemotherapy for the rest of their lives. In others, treatment may be spread out or discontinued after a period of weeks to months provided there is remission. The drugs of this group is classified under 3

TABLE.I. SELECTION OF THERAPY

Type of Tumor	**Type of Tumor**
Lymphoma	Chemotherapy (several drugs available)
Mast Cell Tumors	Chemotherapy, Surgery (+/-radiation)
Fibrosarcomas	Chemotherapy, Surgery (+/-radiation)
Oral Cancers	Surgical, with reconstruction
Mammary Tumors	Surgical (+/-chemotherapy follow-up)
Osteosarcomas (bone)	Surgical + chemotherapy follow-up
Hemangiosarcomas	Surgical + chemotherapy
Skin Tumors	Surgical +/- chemotherapy, radiation
Transitional Cell Carcinomas	Surgical + chemotherapy
Undifferentiated Sarcomas	Surgical +/-chemotherapy, radiation

TABLE II: DRUG ACTIONS AND USE

Drug	Mechanism of action	Dose
Mechlorethamine	Alkylation of DNA,inhibits translation and transcription	Dogs-5mg/m^2 IV
Cyclophosphamide	- do -	Dogs and cats:50mg/m^2 PO on alternate days 100-300mg/m^2 IV/3 weeks
Melphalan	- do -	Dogs and cats:0.1mg/kg PO daily for 7 days
Chlorambucil	- do -	Dogs and cats:2-5mg/m^2 PO for 1-2 days
Busulphan	Cell cycle phase non specific alkylation agent	Dogs and cats:3-4mg/m^2 Once daily
Thio TEPA	Cytotoxic agent	Dogs and cats:9mg/m^2 Single dose
Lomustine	- do -	Dogs and cats:60mg/m^2 PO Once in 7weeks
Carmustine	- do -	Dogs and cats:50mg/m^2 IV Once in 6 weeks
Decarbazine	- do -	Dogs and cats:200-250mg/m^2 IV Once daily for 5days
Methotrexate	Stimulate folic acid, inhibit DNA and RNA synthesis	Dogs and cats:2-5mg/m^2 PO or IV Once daily
6-mercaptopurine	Stimulate purine, inhibit cell division	Dogs and cats:150-200mg/m^2IV every 7 days
5-flurouracil	Cell cycle phase non-specific cytotoxic agent	Dogs and cats: 75-100mg/m^2 IV daily for 2 days
Cytarabine	Cell cycle phase specific with action on S phase	Dogs and cats: 0.5-0.75 mg/m^2 IV every week
Vincristine	Block mitosis in metaphase	Dogs and cats: 2-2.5mg/m^2 IV every week (For all vinca)
Vinblastine	- do -	- do -
Dactinomycin	Intercalate between GC pair	Dogs and cats: 0.5mg/m^2 IV
Doxorubicin	Intercalation of DNA and Generation of free radicles	Dogs and cats: 30 mg/m^2 IV every 3 weeks
Bleomycin	Oxidative damage to deoxyribose	Dogs and cats:10-20 unit/m^2 IV every week
L-asparaginase	G phase specific drug	Dogs and cats:10000-20000 unit/m^2 IV,SC,IM every week
Cisplastin	Binds to Guanine of DNA	Dogs and cats:60-70 mg/m^2 IV for 20 minutes every 3 week

TABLE III: TRADE PREPARATIONS AVAILABLE IN INDIA

Drug	Trade preparations
Cyclophosphamide	Cyclophosphamide Inj. (500mg), Cyphos Inj (1g, 200mg, 500mg), eldamide (50mg, 100mg, 200mg, 500mg), oncophos (1g, 200mg, 500mg)
Dactinomycin	Casmegen vial (500mcg), Dacmozen Inj (0.5mg)
Daunorubicin	Daunocin Inj (20mg), Daunomycin (20mg), Daunocide (20mg)
Chlorambucil	Leukeran Tab (2mg, 5mg)
Cisplastin	Blastolem Inj (10mg, 50mg), Cisplan Inj (10mg, 5mg), Cisteen Inj (10mg, 50mg)
Busulphan	Busulphan Tab (2mg), Mylephan (2mg), Myleran Tab (2mg)
Bleomycin	Bledmax Inj. (15mg), Bleocin Inj (15mg), Bleocip Inj (15mg)
Asparaginase	Leucoginase Inj (5000 IU), Oncoginase (6000 IU)
Cytatarbine	Arasid Inj (1g, 100 mg, 500mg), Cytabin Inj (100mg, 500mg,1000mg)
Doxorubicin	Adrim Inj (2mg), Adrosal Inj (10mg), Cadria Inj (10mg), Doxolem Inj (10mg), Oncodox Inj (10mg)
Etoposide	5FU-CBC (250mg, 500mg), Fivocil (250mg, 500mg), Florac (50 mg)
Flurouracil	FU-CBC (250mg, 500mg), Fivocil (250mg, 500mg), Florac (50 mg)
Interferon alpha	Alferon Inj (3MIU), Intalfa Inj (3MIU, 5MIU)
Lomustine	Lomtil Cap (40 mg), Lomustine (40mg)
Vinblastine	Cytoblastin Inj 10 mg, Vblastin (10mg)
Vincristine	Alcrsit (1mg vial), Cytocristin (1mg), VCR Inj (1mg/ml)

headings - Cytotoxic drugs, Immunosuppressants and Sex hormones

A. Cytotoxic drugs

1. Alkylating agents
   a) Nitrogen mustards eg: Mechlorethamine, Cyclophosphamide, Melphalan, Chlorambucil and Efusfmide
   b) Alkyl sulphonates eg: Busulphan
   c) Ethylenemines and methylmelamines eg: Thio TEPA and Hexamethylmelamine
   d) Nitrosoureas eg: Lomustine, Carmustine, Semustine and Streptozocine
   e) Triazenes eg: Decarbazine and Temozolamide

2). Antimetabolites
   a) Folic acid analogues eg: Methotrexate
   b) Purine analogues eg: 6-mercaptopurine, Azathioprine, fludarabine
   c) Pyrimidine analogues eg: 5-flurouracil, Floxuridine, Cytarabine and Gemcitabine

3) Mitotic inhibitors
   a) Vinca alkaloids eg: Vincristine and Vinblastine
   b) Taxanes eg: Paclitaxel and Docetaxel

4) Antitumour antibiotics
   a) Actinomycins eg: Dactinomycin
   b) Anthracycline antibiotics eg: Doxorubicin, Epirubicin, Idarubicin, Daunorubicin
   c) Other antibiotics eg: Bleomycin, Mitoxanthrone, Mitomycine and Mithramycine

5) Epipodophyllotoxins eg: Etoposide and Tenioposide

6) Enzymes eg: L-asparaginase and Pegapargase

7) Miscellaneous eg: Cisplastin, Carboplastin, Hydroxyurea, Procarbazine, Mitotane, Aminoglutethamide

B. Immunomodulators

eg: Corticosteroids, Azathioprine and Interferons

C. Sex hormones and its antagonists

eg: Oestrogens, Antioestrogens (Tamoxyfen), Androgens, Antiandrogens (Flutemide), Progestogens and GnRH analogues.The dose rates are given in Table II.

Trade Preparations

Mainly drugs like immunosuppressants and anti sex hormones are available in the veterinary field. Other preparations are given in Table III

Side Effects

Compared to people who receive chemotherapy, animals experience fewer side effects because of the lower dose of drugs and less use of combination therapy. The tissues that are typically more sensitive to chemotherapy are the intestinal lining, bone marrow and hair follicles. Toxic effects are responsible for decreased apetite, vomiting and diarrhea. Suppression of the bone marrow by chemotherapeutic agents may cause a drop in white blood count, red blood cell count etc. So there should be a regular check for these parameters. Hair follicle in dogs that are wire haired and non-shedding may be particularly susceptible to chemotherapy, however the hair re-grows once chemotherapy is withdrawn.

A dog with cancer requires adequate water, calories, proteins, vitamins and minerals as a supportive measure. In many cases we are unable to cure veterinary cancer patients. Our goal is therefore to improve the quality of life of pets.

References

1. Adams, H.R. (2001) Veterinary Pharmacology and Therapeutics, 8th edn. Iowa state University press, 1064-84pp.
2. Hardman, J. G. and Limbird, L. E (2001) The pharmacological basis of Therapeutics, 9th edn., 1225-1233pp
3. Jaffreys, C. D (2005), Canine Cancer, *J.Am Anim Hosp Assoc* .41: 221-226
4. Sandhu, H. S. and Rampal, S. (2006) Essentials of Veterinary Pharmacology and Therapeutics, 1st edn., Kalyani Publishers, 1355-58pp.
5. Thripathi, K. D. (2000) Essentials of Medical Pharmacology, 4th edn., Jaypee publishers, 825-39pp

Author

Dr.Nisha.A.R, Assistant Professor, Department of Veterinary Pharmacology & Toxicology, College of Veterinary & Animal Sciences, Thrissur

PROLONGED GESTATION IN BITCHES

Venugopal R.

Duration of gestation in bitches is highly variable if it is calculated from the date of first or last breeding. If we count with breeding dates, whelping occurrs as early as day 54 or as late as day 72. The inability to predict whelping dates more accurately using the date of breeding is because of several reasons. The variation is attributed to the potential viability of canine spermatozoa for a period of 4 to 11d in the female reproductive tract and the long period of sexual receptivity in bitches. Prolonged duration of pregnancy is of concern if it lasts beyond day 60 of confirmed dioestrous (using vaginal cytology), beyond day 66 from the LH surge (using serial serum progesterone assay or vaginoscopy) or beyond day 68 from the date of first breeding.

Prediction of Gestation

Duration of gestation can be reliably predicted by serial vaginal cytologies, vaginoscopies or progesterone assays. Vaginal cytologies can be used to determine the onset of oestrous by maximal cornification or maturation of epithelial cells. Vaginoscopy to determine crenation or angulation of vaginal mucosal folds may also help to determine the stage of oestrous cycle. The mucosa is sharply angulated in mid to late oestrous, it is rounded with pronounced wrinkling in early oestrous and early dioestrous.

Progesterone assay in bitches is quiet useful for predicting the day of ovulation and whelping dates. This is because the serum progesterone levels in bitches will raise along with LH surge during oestrous and the LH surge precedes ovulation by 2 days. Progesterone assay can be done by using RIA or ELISA kits. If progesterone concentrations are 1-1.9 ng/ml ovulation occurs 2 days later, and breeding should be done within 4 days (3-6 days). If progesterone concentrations are 2-3.9 ng/ml ovulation occurs 1 day later, and mating should be done 3 days later (2-5 days). If progesterone concentrations are 4-10 ng/ml ovulation occurs on the day of sample collection, and breeding should be done 2 days later (1-4 days). With these recommendations the bitches will whelp 65, 64 and 62 days respectively after single mating or AI.

While determining the whelping dates, after a thorough physical examination one can go for abdominal radiography or ultra sonography. This is essential to confirm that the bitch is pregnant as opposed to pseudo pregnant. Ultrasonography is the preferred tool when foetal viability is to be assessed. Foetal death can be associated with an apparent prolongation of gestation due to the absence of foetal stress and the series of events that provoke the process of parturition. The bitch with a litter of dead foetuses usually requires surgery to remove the fetuses in order to avoid infection. Gestation length may be prolonged due to primary uterine inertia. This results in inadequate uterine contractions which will delay the process of whelping. Severe hypocalcaemia is uncommon in prepartum bitch because she is not lactating or is lactating only small quantities of milk. However mild hypocalcemia may decrease the strength or number of uterine contractions sufficient to initiate whelping. Gestation may also be prolonged if a single foetus is present, presumably because a single foetus is less stressed in uterus, delaying the onset of parturition.

The bitch with prolonged gestation can be managed by following a thorough history and physical examination. As a general rule, if the bitch is healthy and if the foetuses are viable one can wait up to 70 days from the date of first breeding. Meanwhile the rectal temperature should be recorded twice daily to predict the onset of whelping. If the stage two labour is not apparent within 48 hours after the drop in rectal temperature to less than 100F or if the gestation length exceeds 70 days from the first day of breeding, a caesarian section is recommended.

Conclusion

To conclude, accurate prediction of the date of parturition in bitches is clinically useful to prevent or minimize reproductive losses by timely intervention. For example, an accurate method of predicting the date of parturition is necessary to plan an elective cesarean section. Intervention in full term pregnancy can reduce puppy mortality resulting from obstructions of the pelvis or vagina, histories of primary or secondary uterine inertia, or prolonged parturition. For bitches with histories of pyometra, abortion, embryonic reabsorption, or insufficient luteal phase, accurate assessment of gestational age can help evolve treatment strategies.

References

1. Elits B. E., Davidson A. P., Hosgood G., Pacamonti D. L., Baker. D.G., (2005), Factors affecting gestation duration in the bitch., Theriogenology, 64(2) 242-51.
2. Kimy, Travis A. J. and Meyers-Wallen. (2007), Parturition prediction and timing of canine pregnancy., Theriogenology, 68(8), 1177-82.
3. Iron P. C., Nothling J. O., and Volkmann D.H., (1997), Failure of luteolysis leads to prolonged gestation in a bitch- A case report, Theriogenology, 48(3)353-9.
4. Luvoni G. C. and Beccalglia M., (2006), The prediction of parturition date in canine pregnancy., Reprod. Domest. Anim., 41(1),27-32.
5 Okkens A.C., Teunissen J. M., Van Osch W., Vander Brom W. E., Dieleman S. J., Kooistra H. S., (2001), Influence of litter size & breed on the duration of gestation in dogs, J. Reprod. Fertil. Suppl. 57,193-7
6. Tsutsui T., Hori T., Krishna N., Kawakami E., Concannon P.W., (2006), Relation between mating or ovulation and duration of gestation in dogs., Theriogenology, 66(6-7) 1706-8.

Author

Dr.R.Venugopal MVSc. (OG),
Veterinary Surgeon,
Vilappil, Vilappilsala.po.
Thiruvananthapuram

JIVA, 6(2):2008

TREATING A VIPER AMIDST MEDIAMEN

Revathy T.R., Jacob Alexander, Terrance B.R. and Rajeev T.

We, the vets in Thiruvananthapuram D.V.C. got curious on seeing the volunteers of 'Zoo Watch Snake Rescue' along with a fully equipped media people in the O.P. on one fine morning. Three of the volunteers were carrying a P.V.C. tube which was covered by a cloth on one end . Pets under treatment and their owners who were already been there started their queries. Our curiosity turned out to perplexity within a short time when the volunteers explained about the snake inside the tube. It was a Viper injured at the tail region by a J.C.B. while demolishing a hill in Kuttiyani near Vattappara and was rescued by this people.

Seeing the media men focusing on to us we masked our feelings, raised to the situation and asked the volunteers to keep the patient on the examination table. It was safe for us to examine the special patient who had been restrained by "tube restraint method" which is a standard method for the handling of venomous snakes.

Basic steps in this restraining method is to choose a tube preferably a transparent one, with an inside diameter that will not allow the snake to turn around i.e, inside diameter should be less than the length of the snake's head or slightly larger than the snake's mid body girth. Cover one end of the tube using a pouch made of cloth which will allow trouble free breathing. Secure the pouch on the tube tightly. Use tongs that are longer than snake's striking range to hold the tube. Grasp the tube in the middle with the tongs and slowly bring the open end of the tube towards the snakes head. Using hooks that are longer than snakes striking range gently hook the animal and manipulate it into the tube. Thanks to the volunteers who had already restrained our patient!

The injured tail was kept outside the tube which made our examination easier. To add to our curiosity we saw a paired spiny pouch like structure outside which had attachment to the injured tail region. It took a short while for us to realize that it was the hemipenis- the paired copulatory organ of a male snake. A quick search in the internet confirmed our diagnosis. So the one in the table is a male with a prolapsed hemipenis.

Each hemipenis consist of a tube of erectile tissue that can be everted like the finger of a glove. These lie on either side of the base of tail forming distinct thickenings and with a little practice the sex can usually be determined, however it is not wise to fully rely on this method. The distal end of the organ is attached to a long retractor muscle. During copulation only one organ is inserted at a time but which one is immaterial and depends upon the side the male happens to be at that time.Prolapse of this organ occur as a result of infection, forced separation during copulation or as a result of swelling secondary to probing for sex determination. Here the probable reason may be the second one as the volunteers told that there was another snake at the site which had escaped. In addition to the prolapsed hemipenis the tail of our patient was also severely injured.

Arrived the time for surgical judgement - whether to replace the prolapsed hemipenis to the cloaca and to treat the injured tail to heal or to amputate the tail along with prolapsed hemipenis. In case of replacement of prolapsed hemipenis organ should be cleaned, gently lubricated and can be replaced into cloaca. After replacing the organ a purse string suture can be placed in the cloaca tight enough to prevent further prolapse. Suture can be made with chromic catgut. Surgical removal is indicated in cases in which the organ is severely swollen and damaged. In this particular case the hemipenis was gangrenous, swollen and had offensive smell. Tail injury was such that the articulation of tail vertebrae was disrupted. So our decision was to amputate the tail and hemipenis.

Surgical technique- First step is to anaesthetise

the snake. General anaesthesia in snakes can be effected with inhalant anaesthetic like Isoflurane at a concentration of 5% or dissociative anaesthetic like Ketamine HCl @ 30mg / kg body weight i/m or tranquilizer like Diazepam @ 0.1- 0.2 mg / kg body weight i/m. The available one with us was Ketamine. Induction of anaesthesia in snakes is indicated by loss of righting reflex. This can be assessed by gently moving the box or tube upside down where the snake is kept. If the animal no longer moves it has lost it's righting reflex and can be manipulated. After anaes thetizing the viper the site around the injury was painted with Tr.Iodine. Prolapsed mass of hemipenis was ligated with catgut. Afterwards it was cut and removed using scissors. The amputation of tail was much easier as it got detached when we made a cut with scissors. So the complicated procedure turned out to be a simpler one. Skin at the site was sutured by horizontal mattress suture using nylon. Applied Tr.benzoin at the sutured site and bandaged with gauze.

Postoperative medication was done with Meloxicam –'Melonex' @ 0.2mg / kg body weight i/m and Amoxicyllin sulbactum 'Amoxirum forte' @ 20 mg / kg body weight i/m. These drugs were continued for five more days. The wound was cleaned with povidone iodine and metronidazole liquid and dressed regularly.

On completion of the surgical procedure we relaxed a little bit. The people around us seemed to be satisfied with our service. The viper was kept in the Zoo Watch Snake Rescue at Thirumala till he had recovered fully. He was kept in an empty glass fish tank amidst polythene bags filled with water at 45°C that was changed frequently. After about five days he was weak so a raw egg was mashed and forced fed using a tube and syringe. One week apart he had devoured three live mice, by that time the wound healed completely. The sutures were removed and he was set free into the forest in Neyyar.

As veterinarians, we are bound to treat any animal species – whether domestic or wild. In a society with a great number of animal lovers and media channels sometimes we may find ourselves in hard situation like this, which is mentioned here. So our approach should be a combined effort to confront any such case with the available resources. The purpose of this article is to draw attention to such an instance.

Reference

1. Ballard, M.B, (2003), Exotic Animal Medicine for Veterinary Technician, P: 115-126
2. Jadhav S.S., Disale, D.S. and Mukherjee, S., Tail Amputation in Indian Spectacled Cobra – A case Study, Zoos' Print J., 22: 2950, 2007
3. Patnaik, T.K., Nath, I. and Bose, V.S.C., Treatment of an Indian Cobra, Zoos' Print J., 22, 2948, 2007.
4. Sharma, B.D., (2001) Snakes in India, Asiatic Publishing House, New Delhi, P:16, 121
5. Smith, A.M., (2003) Handbook of Indian Snakes, Cosmos Publications, New Delhi, P:9-11

Authors

1. Dr.Revathy, Veterinary Doctor
2. Dr.Jacob Alexander, Veterinary Surgeon, District Veterinary Centre, Trivandrum
3. Dr.Terrance B. Remady, Senior Veterinary Surgeon, District Veterinary Centre, Trivandrum
4. Dr.Rajeev T., Veterinary Surgeon, District Veterinary Centre, Trivandrum

JIVA, 6(2):2008

AN UPDATE ON MASTITIS VACCINES

Sreeja S.

Introduction

Effective immunization against mastitis has been a goal of researchers for many years. Research on mastitis vaccines has been conducted for at least 30 years and several vaccines for controlling mastitis are commercially available now. Effective immunization is difficult because of the very nature of milk. The volume of milk present in the gland dilutes the number of immune cells available to fight infection and milk components such as fat and casein reduce the bactericidal abilities of the infection fighting immune cells. Moreover, the cow is exposed to numerous organisms that have the potential to cause mastitis and the milk is an excellent substrate for bacterial multiplication. In addition to this various other factors like incomplete knowledge of bovine immune defenses, diversity of bacterial species, strains and antigens, selection of relevant antigens, lack of appropriate immunization schedules etc. makes this a difficult task to accomplish.

The past decade has seen the development of effective and economical [1] R-mutant vaccines against mastitis due to gram negative organisms. Development of vaccines for other pathogens has been noticeably slower. Mastitis vaccine research in the past has led to the commercialization of several products. Commercial mastitis vaccines are currently available in countries like United States for immunization against mastitis caused by *Staphylococcus aureus*, *Escherichia coli* and *Mycoplasma bovis*.

Vaccines against coliform organisms

All coliform mastitis vaccine formulations use gram negative core antigens (Core antigen is a part of the gram negative cell wall consisting of a short chain of sugars. With minor variations, the core polysaccharide is common to all members of a bacterial genus) to produce non-specific immunity directed against endotoxins produced.

(i) **J-5 bacterin (Pharmacia & Upjohn)**

It is an Escherichia coli bacterin (a suspension of killed or weakened bacteria used as a vaccine) recommended for use in healthy dairy cattle for the prevention of clinical mastitis caused by E. coli. For effective mastitis control, this product should be used in conjunction with acceptable good management practices.

Regimen: Three doses are required. Each of the 5 ml doses are administered subcutaneously, one hand-width cranial to the shoulder. Cows or heifers can be vaccinated at 7th and 8th month of gestation followed by the third dose within 2 weeks postpartum. Local swelling may occur occasionally and persist at the injection site. The cows should not be vaccinated 60 days before slaughter.

Presentation: 20 dose (100ml) and 50 dose (250 ml) vials.

(ii) **Master guard J5 (Agrilabs)**

This is also an Escherichia coli bacterin and contains chemically inactivated culture of J5 mutant E. coli and Suprimm@ adjuvant. It is used as an aid in the prevention of endotoxemia caused by E. coli in healthy cattle 6 months of age or older.

Regimen: Three doses of 2 ml each at 3 weeks intervals administered intramuscularly or subcutaneously. Annual booster doses are recommended at dry-off and 2-3 weeks prior to calving.

Presentation: 10 doses (20ml) and 50 doses (100ml)

(iii) **J-Vac (Merial)**

It is an E. coli bacterin – toxoid. Recommended for vaccination of healthy cattle (cows, heifers) as

1 R refers to the amount of identifying O-side chains which still exist on a mutated bacterium cell wall

an aid in prevention of mastitis due to E. coli and effects of endotoxemia caused by Salmonella typhimurium. It contains gentamicin and nystatin as preservatives.

Regimen: 2ml (1 dose) injected intramuscularly or subcutaneously at 7 months of gestation or at dry-off and revaccinated 1-3 weeks before calving. Revaccination is done annually. Do not vaccinate within 21 days prior to slaughter. In rare instances, administration of vaccines may cause lethargy, fever and inflammatory or hypersensitivity reactions. Treatment may include antihistamines, anti-inflammatories and epinephrine.

(iv) **Endovac bovi (Immvac)**

It is a Salmonella typhimurium bacterin-toxoid, Re-17 derived mutagenically, this product contains an oil adjuvant. Formaldehyde is used as the preservative. It is used for vaccination of healthy cattle to prevent clinical mastitis due to E. coli and the effects of endotoxemia caused by Salmonella typhimurium, Pasteurella multocida and Pasteurella hemolytica.

Regimen: 2 ml intramuscular injection followed by another dose in 2 or 3 weeks. Revaccination is annually recommended for cows and heifers during the third trimester of pregnancy. It cannot be administered to cows with mastitis or showing signs of septicemia.

Presentation: 20 dose (40ml) and 50 dose (100ml) vials.

Vaccines against Staphylococcus aureus

There are two S. aureus bacterins marketed by U.S dairy producers but they are simply separate licensures of the same product. These are marketed as Somato-staph and Lysigin.

(i) **Lysigin (Boehringer Ingelheim)**

It is a S. aureus bacterin. It contains a lysed culture of highly antigenic polyvalent somatic antigen containing phage types I, II, III, IV and miscellaneous groups of S. aureus. The vaccines are recommended for vaccination of healthy susceptible cattle as an aid in the prevention of mastitis caused by S. aureus.

Regimen: 5ml injection intramuscularly, repeated in 14 days and followed by a single 5 ml booster dose each 5 – 6 months. All heifers can be vaccinated by 6 months of age.

Presentation: 10 doses (50ml) and 50 doses (250ml)

Vaccines against Mycoplasma bovis

(i) Mycomune mycoplasma bovis bacterin (Agrilabs)

Recommended for prevention of mastitis caused by Mycoplasma bovis in healthy cows and heifers. Dosage is 2ml given S/C in the neck region. It is recommended that animals be vaccinated 3 times at 2-4 week intervals prior to calving. The 3rd dose should be given at least 2-3 weeks prior to calving. Semi-annual revaccination is recommended.

Presentation: 10 doses, 50 doses

Other mastitis vaccines

The increased frequency of mastitis caused by environmental Streptococci has resulted in a number of attempts to produce vaccines against these pathogens. There has been a sustained focused research effort for vaccines directed against Streptococcus uberis. Repeated immunization with a killed S. uberis vaccine was effective reducing the number of bacteria in milk that were experimentally challenged with the same strain of S. uberis. A novel vaccine based on the plasminogen activator of Streptococcus uberis appears promising. Till date there are no commercial vaccines available that protect against Streptococcal mastitis.

Conclusion

Considering the present situation regarding vaccination against mastitis, it is concluded that vaccines are not widely used as a control measure, especially in developing countries like India, mainly because of the high cost. Attempts to immunize cows against mastitis are innumerable. In spite of this a vaccine which proves to be useful under field conditions is awaited.

Bovine mastitis can be likened in several immunological respects to human diseases caused by encapsulated bacteria. This presents the vaccine developer with the opportunity to benefit from the recent advances made in the field of [1] polysaccharide vaccines. The incorporation of novel immunomodulators such as CpG oligodeoxy nucleotides, and the employment of alternative vaccine delivery methods such as antigen microencapsulation have the potential to increase the magnitude and quality of the immune response. A successful mastitis vaccine will serve as an additional mastitis control tool in a comprehensive udder health management program. Immunization will complement, but not replace management practices that promote reduction of teat end exposure to pathogens.

References

1. www.dairybusiness.com/western/Sep00/colmast

2. www.uwex.edu/MilkQuality/PDF/mastitis_vacine_efficacy

3. Hogan JS, Smith KL, Todhunter DA, Schoenberger PS. 1992. Field trial to determine efficacy of an Escherichia coli J5 mastitis vaccine. J Dairy Sci 75:78-84.

4. Yancey RJ. 1993. Recent advances in bovine vaccine technology. J dairy Sci 76:2418 - 2436.

Author

Dr.Sreeja S., Veterinary Surgeon, Dept of Animal Husbandry, Kerala.

[1] like Salmonella typhi Vi vaccine, and Pasteurella haemolytica A1 capsular polysaccharide vaccine.

JIVA, 6(2):2008

BIOMECHANICS AND ITS APPLICATIONS IN VETERINARY PRACTICE

Selvinjose S. and Rajee P.V.

Introduction

Biomechanics is mechanics applied to biological system. It is governed by laws of statics and dynamics. It combines mechanics with essential elements from biology, physiology, anatomy, mathematics, physics and computer science. Biomechanics is a combination of biostatics and biodynamics. Biostatics is concerned with the principles of construction which ensure that individual parts or body as a whole are in equilibrium when the animal is moving or standing. Biodynamics applies to the movement of body especially during locomotion. The anatomical feature of the animal body can be best compared with the mechanical structure like a bridge or a machine.

Principles

The structural principles of the body are best understood with regard to its overall construction of trunk and limbs. The trunk is compared to a bow and string or an arched bridge, while the fore and hind limbs act as supporting columns or cantilevers. Biodynamic movements can be in the individual parts of the body or the body as a whole.

Centre of Gravity and Stay Apparatus

The position of body's centre of gravity is of great static importance in this regard. The centre of gravity in most animals is found in the median plane at the intersection of a transverse plane lying immediately behind the xiphoid process and a horizontal plane drawn below the lower and middle third of the trunk. The position of the centre of gravity is not constant and has great significance as it determines the proper distribution of load in draught animals and proper saddling, seating of a rider on the horse.(Nickel et al.,1986)

The conditions for maintaining equilibrium are conducive to animals in standing position compared to man. This is because points of the four toes outline the relatively large rectangular surface supporting the centre of gravity. The body weight is not evenly distributed through the four limbs. Since the centre of gravity lies nearer the fore limbs they carry more weight than the hind limbs, even when the animal is standing square. About 55% of the body weight is carried by the forelimbs.

Stay Apparatus

Horses can rest for long periods of time in standing position. This has the advantage of giving them a more distant horizon to spot the approach of predators and also allows a faster getaway should the predators surprise them. This is due to the stay apparatus, a system of muscles and ligaments that "lock" the main joints into positions without expending much energy. So the muscles do not get fatigued. The arrangement is much the same in the fore and hind limbs. Normally both the forelimbs are "locked" but one hindlimb is relaxed or 'rested'.

The stay apparatus in the forelimb consist of

1. Suspensory ligament
2. Deep digital flexor tendon with deep digital flex muscle running from elbow to the back of the pedal bone.
3. Carpal check ligament which joins the deep digital flexor tendon to the cannon bone.
4. The superficial digital flexor tendon and muscle from elbow to short pastern joint.
5. Radial check ligaments.

The stay apparatus of the lower hindlimb is similar to the forelimb but the superficial flexor tendon does not have an equivalent to the radial check ligament higher up, therefore the patella or stifle plays a vital role. The bone has 'hook' which can lock over the inner trochlear ridge of the femur in order to fix

the whole hind limb rigid. If one point of the leg is locked it contracts the tensor fascia muscle which attaches to the patella, so slightly lifting and freeing the bone during movement.(Ommer and Harshan,1995)

Biomechanics describes motions of the body during typical activities, predict which muscles are responsible for controlling movement, quantify the forces acting on the body during movement, understand the limitations of different experimental and analytical techniques used to quantify movement, interpret motion data accurately and evaluate studies of movements. Biomechanics focuses on 3 important themes for analysis: safety, effectiveness and efficiency. Safety means free of injury. Effectiveness is closely related to the level of performance. The main interest here is to maximize the output and effectiveness is the main target for training; efficiency is related to the amount of effort required to do certain mechanical tasks.(Reul et al.,1980)

APPLICATIONS OF BIOMECHANICS

Alternate Medicine

Over the last 10 years, natural healing methods for animals have become a hot topic. Not long ago, alternate treatments, such as chiropractic care and acupuncture were considered by veterinarians and horse owners as nothing more than a mere quackery. As humans begin to embrace the leading powers of alternate methods of treatment for themselves, equine patients too are receiving the benefits.

Chiropractic Medicine

Chiropractic medicine involves the use of specific, controlled forces or thrust applied to a joint or bone to cause a change in the reflexes of the joint, nerve or muscle. The spinal column is made up of individual vertebrae, which surround and protect the spinal cord and sensitive nerve fibers. As nerve bundles exit the spine, they branch off and travel to the horse's joint, skin and muscles. As the horse moves, the spinal column flexes and bends. Chiropractic medicine focus on the musculoskeletal, neurological and vascular conditions of the spine, nerves and muscles near the spinal cord, as they become thickened overtime, which can produce painful and crippling spasms. Performance-horses are asked to turn, twist, stop, leap and jump, all of which increase the amount of muscle tension and can cause damage to the back and spine. As a result the normal range of motion of a horse is compromised and it cannot perform to the highest ability.(Hodgson and Rose,1994)

Bone and Fracture Repair

An explosion of new information and techniques available to the veterinary orthopedic surgeon with regard to fracture fixations has occurred. Because of the numerous options available for successful fracture management, it has become increasingly necessary for an orthopedic surgeon to have a basic understanding of the biomechanics pertaining to bone and implant systems (Robert, 1999). Mechanics describes the dynamic sources acting on a structure which got to change the structure's form and directions of motion. Biomechanics is the applications of mechanical engineering principles to biological systems in the hope of gaining insight into

1. The material and structural characteristic of a living material such as bone.
2. Input of intrinsic as well as extrinsic physiological and non physiological forces on biological systems, and
3. Influences of modern technology on biological system.

Testing the applicability, the use of newer biocompatible materials may offer biological advantage in repair and reconstruction processes, for example, combining the principles of biomechanics and instrumentation, intra-medullary, inter-locking nail fixing systems were developed in veterinary practice.(Mc Duffee et al., 2000 and Wheeler et al.,2004)

Mechanics of Walking and Running

The gait of mammals is described by means

of a few parameters. Dimensionless parameters show marked similarities in walking and running behaviours, between mammals of very different sizes. Only certain gaits allow a quadruped to remain stable throughout the stride. Records have been struck of the forces exerted by the feet of man and other mammals in different gaits. Different pattern of forces are exerted in walking and running but simple equations capable of describing both form the basis of mathematical modes. Force plates, force shapes, pressure sensitive mats, strain gauges and accelerometers are used to measure the pressure exerted by the foot of animals.

A model of running shows how tendon elasticity can save metabolic energy and also explains the observation that oxygen (hence, energy) used per unit distance traveled tends to be independent of speed.

Measurement and Analysis System

Parameters of measurement

Basic stride and gait descriptions consist of linear and temporal variables. Temporal variable (eg. stride duration) are calculated mainly from frame numbers in high speed cinematography or video recordings. Some temporal variables also can be derived from force plate and measuring shoe recordings. Linear gait variables (eg. stride length) can be measured from well defined reference points in film and video registrations.(Sarah and Zeo,1996)

Joint Kinematics

Joint kinematics ie, angular displacement, is mainly investigated by applying reference points to the skin of horse at standard positions in relation to the points under study. The position of reference points under locomotion is determined from high speed cinematography video or other opto-electronic system. At slow gaits electro-goniometry has been used for some joints.

Confirmation

Subjective and objective judging of confirmation

Confirmation is the body shape, form or outline of an animal. While selecting horse and pet animals for breeding, racing, show purpose etc., confirmational details have long been used as markers of such qualities of performance and soundness. Traditional confirmation has been judged subjectively against an ideal or standard of perfection. In studies where several strides were evaluated in the same horse, good agreement was achieved for some overall type traits, but large discrepancies were rendered for most conformational details.(Hodgson and Rose,1994)

Biomechanics and body balance

Biodynamic research involved in injury impact is of great social significance and is a challenging mechanics problem. Perception of the external world, reaction and motions of living organism require the action of highly specialized mechano-receptive system. In the auditory system, the vestibular apparatus and the pacinian corpuscles (mechanic receptors) have been selected as representative examples.

Summary

The principles of biomechanics are applied in video and optical motion analysis in biomedical research. In veterinary research and therapeutics, biomechanics play a major role in gait analysis, clinical chiropractice, certification of animals, acupuncture therapy, diagnosis and therapeutic measures in fracture repair and other musculoskeletal disorders. Thoroughbred evaluation in commercial horse racing performance is inevitable without biomechanics applications as also in detection and monitoring of bone disorders in Thoroughbred horses. Biomechanics is an area of science that has many applications in improving sporting and safety; and reducing the risk of injuries in animals.

References

1. D.R.Hodgson and R.J.Rose., 1994. Biomechanics, Gait and Confirmation. Chapter 3. In text book. The Athletic Horse, Ist edn, W.B.Saunders Company. pp:27-44.

2. McDuffee .L.A., S.M.Stover, J.M.Bach, and K.T.Jaylor, 2000. An invitro biomechanical investigation of an equine interlocking nail. Veterinary Surgery. 29(1) : 38-47.
3. Nickel R. Schummer, A.and E.Seiferle, 1986. "Statics and dynamics of locomotor system". In text book. The Anatomy of Domestic Animals, Vol-1. Vth edn., Verlag paul parey. Berlin. pp: 444-446
4. Ommer, P.A. and K.R.Harshan, 1995. Chapter 9. Applied Anatomy of Domestic Animals, Ist edn, Kerala Agricultural University. pp.92-97.
5. Reul H., Ghista D.N. and G.Rau 1980. Perspectives in Biomechanics. Vol-1 A&B. Ist edn., Harwood academic publishers, London.
6. Robert M. Radasch., 1999. Biomechanics of bone and fracture. Veterinary clinics of North America, Small Animal Practices. Vol-29, pp. 1045-1079.
7. Sarah Pilliner and Zeo Davies, 1996. Equine Science, Health and performance. Ist edn.. Black well publishers. Pp.237-247
8. Wheeler,J.L., W.P. Stubbs, D.D.Lewis, A.R.Cross, and S.R.Guerin, 2004. Intramedullary Interlocking nail fixation in dogs and cats, Biomechanics and instrumentation. Compendium-on-continuing education-for-the practicing Veterinarians. Veterinary Surgery, 26(7):519-529.

Authors

1. Dr.S.Selvinjose, Veterinary Officer, Trivandrum Dairy

2. Dr.P.V.Rajee, Veterinary Surgeon, Department of Animal Husbandry, Trivandrum

JIVA, 6(2):2008

SOLID WASTE UTILISATION IN DAIRY FARMS

Senthilkumar S., Balusami C., Sivakumar T. and Balachandar J.

Wastes of animal origin are one of the major under-utilized resources in India. Animal wastes refer mainly to excreta (dung, urine etc.) along with bedding and mixed soil. Though animal wastes cause collection and transportation problems, they are valuable source of organic matter and plant nutrients. These wastes could not be fully exploited due to the non-availability of viable technology for economic recycling. The technology has to be cost effective, eco-friendly and socially acceptable to the farmers at village level.

Advantages of recycling animal wastes

1. Supplying essential plant nutrients
2. Improving soil physical properties
3. Reducing the accumulation of animal wastes near the livestock farms/ dairies/ houses etc.,
4. Reducing health hazards
5. Providing employment and income to many people
6. Improvement of environment quality

Composition of dairy solid waste

The wastes from ruminants have a different composition from wastes of monogastric animals. The faeces of ruminants consist mainly of undigested feed materials and it also contains residues from digestive fluids, waste mineral matter, worn out cells from gastrointestinal tract, bacteria and foreign matter.

Undigested protein is also excreted in the faeces and the excess nitrogen from the digested protein is excreted in urine as urea. Potassium is absorbed during digestion, but most of it is excreted through urine. Ca, Mg, Fe and P are excreted mostly in faeces. The chemical composition and the nutrients in different species of animal excreta are shown in Table I.

Utilization of manure

There are various methods for handing and treating animal waste. The simplest and most effective method is to utilize them as a soil nutrient by recycling it back to the soil. Methods that are available for applying animal excreta into the soil include.

i. Direct surface application followed by immediate ploughing
ii. Application after processing as Farm Yard Manure
iii. Conversion into compost and
iv. Vermicomposting
v. As a feed stock in biogas plants to produce gas and slurry manure.

(i) **Direct surface application**

Both liquid and solid waste is directly spread on the open fields and is subjected to sun drying under natural conditions. This is the oldest and cheapest method of recycling animal waste. The end products are CO_2 and H_2O with an accumulation of N, S, P and minerals in the soil. This method is environmentally undesirable. There is partial decomposition of organic matter with valuable losses of nitrogen and energy.

(ii) **Farm yard manure (FYM)**

The FYM is the decomposed mixture of dung and urine of farm animals along with litter, left over fodder fed to the animals. It is estimated that FYM from all animal excreta in India can supply 6.33 million tonnes of N, P_2O_5 and K_2O per annum. A well decomposed FYM contains 0.7-1.3% N, 0.3-0.8% P_2O_5 and 0.4-1.0% K_2O on dry weight basis. It is also influenced by the processes of handling and storage. Under normal conditions, there is invariable loss of nutrients either by leaching or volatilization when manure remains exposed to rain and sun.

(iii) **Composting**

Composting is a natural process in which organic matter is decomposed by micro-organisms forming humus like substance. This process is in practice for centuries by farmers who stock dung into piles or in pits. Composting can be either aerobic or anaerobic. The advantages of aerobic decomposing are shorter stabilization time, no foul smell and destruction of weeds and pathogens.

(iv) **Vermi-composting**

Vermi-composting is composting aided by earthworms. Worms feed on the organic waste converting it into castings which have high manurial value. Vermi composting achieves the following objectives.

a. Abatement of organic pollution by reduction in waste's bulk density and elimination of foul odour;
b. The production of vermin-fertilizer of vermi-compost for application on land;
c. The production of vermi-protein in the form of earthworms, which can be used as animal feed.

Vermiculture is the latest technique, which is 100 times more efficient than any other conventional techniques. Use of earthworms for waste disposal achieves three ideal objectives:

1. Upgrading the value of the original waste materials so that they can be reduced.
2. Produces the upgraded materials in situ without having to transport waste material over long distance and
3. Yields a final product free of chemical or biological pollutants.

Steps for vermicomposting

1. Dig a pit of about half a meter square, one meter deep
2. Line it with straw or dried leaves and grass
3. Organize the disposal of organic waste into the pit as and when generated
4. Introduce a culture of worms that is now produced commercially
5. Ensure that the contents are covered with a sprinkling of dried leaves and soil everyday
6. Water the pit once or twice a week to keep it moist
7. Turn over the contents of the pit every 15 days
8. In about 45 days the waste will be decomposed by the action of the microorganisms
9. The soil derived is fertile and rich in nutrients.

A comparative analysis of vermin-composting and FYM is given in Table II.

(v) **Bio-Gas Technology**

According to estimates, one kg of cattle dung produces about .073m (1.3c.ft) of biogas at atmospheric pressure. The availability of dung from a medium size cow is approximately 10 kg per day. For the smallest plant producing 1.7 m^3 (60.c.ft) of biogas, waste from at least 5 head of cattle is necessary. Biogas (1.7m^3) produced from this small plant is considered sufficient to meet the cooking and lighting needs of a family of four.

Two products are obtained form the plant, biogas and fermented slurry.

Biogas is non-poisonous, with a characteristic odour, which disappears on burning. When mixed with air, it burns with a non-luminous blue flame without producing any smoke. It has a very low level of inflammability. Biogas is used for household cooking, lighting and power. Special lamps are available for lighting where biogas can been used. For a 100 candle power mantle lamp, approximately 0.13m^3 (4.5c.ft) fuel gas is required per hour. Regarding the production of power, about 0.48 m^3 (17c.ft) of biogas is required to run an engine of 1 horse power for one hour. Combustion engines, commonly available, can be run with biogas. To do this, a special attachment is fitted to the combustion engine. Such attachments are readily available.

The biogas-spent slurry is far better than Farm Yard Manure (FYM) since it is well digested and has

high nutrient contents. A comparative analysis of biogas slurry and FYM is given in Table III.

Biogas is non-poisonous, with a characteristic odour, which disappears on burning. When mixed with air, it burns with a non-luminous blue flame without producing any smoke. It has a very low level of inflammability. Biogas is used for household cooking, lighting and power. Special lamps are available for lighting where biogas can been used. For a 100 candle power mantle lamp, approximately 0.13m^3 (4.5c.ft) fuel gas is required per hour. Regarding the production of power, about 0.48 m^3 (17c.ft) of biogas is required to run an engine of 1 horse power for one hour. Combustion engines, commonly available, can be run with biogas. To do this, a special attachment is fitted to the combustion engine. Such attachments are readily available.

The biogas-spent slurry is far better than Farm Yard Manure (FYM) since it is well digested and has high nutrient contents. A comparative analysis of biogas slurry and FYM is given in Table III.

Conclusion

It is concluded that dairy wastes could be efficiently recycled and anyone of the above technology is economically feasible to the farmers.

Table I: Comparison of Nutrient content in excreta of different animals (in per cent)

Nutrient	Nutrient content of manure (mg g^{-1} dry weight)				
	Cattle	Sheep	Pig	Horse	Poultry
Nitrogen	25-40	20-45	20-45	17-30	28-62
Phosphorus	4-10	4-11	6-12	3-7	9-29
Potassium	7-25	20-29	15-48	15-18	8-29
Calcium	5-8	8-19	3-20	7-29	17-69
Magnesium	5-8	3-6	2-3	3-5	3-8
Sulphur	3-4	2-3	3-5	1-3	4-7

Table II: Composition of vermicompost and FYM (% on dry weight basis)

Constituent	**Vermicompost**	**FYM**
Nitrogen (N)	1.5	0.78
Phosphorus (P2O5)	0.3	0.72
Potash (K2O)	0.56	0.65
Organic Carbon	17.98	24.40
C/N ratio	11.98	31.28

Table III: Composition of biogas slurry and FYM (% on dry weight basis)

Constituent	**Biogas slurry**	**FYM**
Nitrogen (N)	1.41	0.78
Phosphorus (P205)	09.92	0.72
Potash (K20)	0.84	0.65
Organic Carbon	27.32	24.40
C/N ratio	19.37	31.28

References

1. Godwin, D and Moore, J.A. (1997). Manure Management in small farm operations, Oregon State University. EM 8649
2. Handbook of rural Technology for the processing of animal by – products (1989), Bullefin 79, FAO, Rome
3. Micheal, R.O. Frank J.H. and Ronald Minor (1983), Livestock Waste Management. CRC Press Inc. Florida PP 9-130.
4. Miner, R (1995) Livestock Manure Management, Oregon State Universit. EM 8596
5. Moorthy, A.R.S. (000). Recycling of animal wastes for sustainable Agriculture. Indian Dairy year Book. PP 87-290.
6. Neelakandan, S. (1975). Assessment of the availability of cow dung for potential gobar gas production. Agric Situation in India. Pp 30:633
7. Rajalakshmi, P.1996. Effect of vermicompost of vermisulture on the physicochemical properities of soil. M.Sc. (Ag) thesis, Kerala Agricultural University, p.121.

Authors

1. Dr. Senthilkumar S, Assistant Professor, Livestock research station, Kattupakkam, TANUVAS
2. Dr. Balusami C, Assistant Professor, Dept of LPM, COVAS, Pookot
3. Dr.Sivakumar T., Professor & Head, Livestock research station, Kattupakkam, TANUVAS
4. Dr.Balachandar J., Teaching Assistant, Dept of LPM, COVAS, Pookot

JIVA, 6(2):2008

REPORT ON A NEW METHOD FOR CORRECTING TEAT FISTULA

Prasad P.M.

Introduction

Teat fistula is a condition in which an abnormal opening exists from the teat cistern/ teat canal to outside, other than the teat opening. Congenital teat fistula is usually noticed in cows during their first lactation. Milk leaks out through the fistula on letting down of milk. On milking, milk comes out through the teat opening as well as through the fistula, soiling the milker's hand and contaminating the milk in the vessel.

A simple and effective method for correcting the defect is being reported. The method aims at putting a ligation around the external opening of the teat fistula and thereby closing it. The method was tried successfully in four cases of teat fistula in cows.

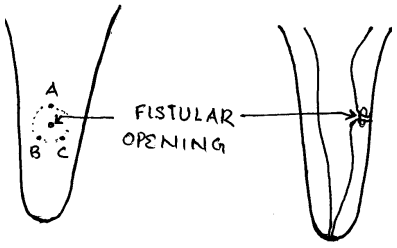
Case history

Four animals were presented to Veterinary Hospital, Kattakada with a history of milk leaking out through an abnormal opening along the side of one teat. All the animals were in their first lactation. Surgical correction of the defect was attempted by putting a ligation around the fistular opening.

Materials and methods

The animals were controlled in standing position. The area was sterilized by applying spirit. The teat was anaesthetized locally by local infiltration of one ml of Xylocaine injection. The mucosal lining of the fistula was scarified using the sharp cutting edge of a 16G inoculation needle. (*Venugopalan, 1982).* Thin braided silk (size 2/0) was used to suture the fistula, with a half circle small round bodied needle.

***Figure** : Diagram showing correction of Teat Fistula*



The skin at a point 3-5mm above the fistular opening (A) was pierced with the needle and was passed subcutaneously in a circular fashion to complete 1/3rd of a circle around the fistula. At this point (B), the needle was pierced out throught eh skin. Again the needle was pierced from the same point (B), passed subcutaneously in a circular manner and pierced out at a second point to complete 2/3rd of the circle (C).

Again the needle was passed subcutaneously in a circular manner from the same point (C) and was pierced out at the first point (A) so as to complete one full circle of suture. The thread was tightened. The ends of the thread which are at first bite now (A) are knotted by surgeons knot. The knot was also pushed slightly inwards so that the suture completely goes inside. Care was taken not to over-tighten the ligation so as to avoid the thread cutting through the subcutis. Tr. Iodine was applied over the area. The teat canula was applied for three days. An antiseptic ointment was applied externally.

After one week the suture was removed in one case and it was retained in other animals.

Result and discussion

In all the animals there was good healing. The animals were milked from 3rd day onwards. The fistula remained closed in all the animals and there was no leaking out of milk.

This method of correction of teat fistula proved to be a simple, effective and inexpensive technique.

Reference

1. Venugopalan, A. (1982). *Essentials of Veterinary Surgery.* 4th ed. Oxford &IBH publishing Co., New Delhi, pp:503

Author

Dr.Prasad, P.M., Senior Veterinary Surgeon, Veterinary Hospital, Malayinkeezhu, Thiruvananthapuram.

CHEMOTHERAPY USING VINCRISTINE IN CANINE NASAL NEOPLASM - A CASE REPORT

Laiju M. Philip, Shihabudheen P. K. and Deepak Mathew D. K.

Introduction

Nasal tumors are neoplasms occurring in the nasal cavity and are common causes of chronic nasal diseases among dogs. Though rare, they may occur in middle aged to older ones (Leib and Monroc, 1997). They generally arise from the ethmoid turbinate region and spread rostrally. They are locally invasive but rarely metastases until quite late in disease process.

Chemotherapy employing antineoplastic agents either singly or in various combinations remains the best method to control disseminated cancers (Brander et. al, 1991). They kill cancer cells or check the cell multiplication and thereby hamper the tumor growth. in the presented case, the effect of Vincristine on nasal neoplasms was studied.

Materials and Method

A male Pomeranian dog aged 8 years was presented at District Veterinary Centre, Kozhikode with the history of dyspnoea, snoring, oozing of blood from left nostril and blood tinged tears. Inappetance and exercise intolerance were also reported. Previously it was treated with antibiotics and anti histaminics (parenteral therapy and nasal instillation).

Clinical examination showed a rectal temperature of 102.2^0 F, respiratory rate of 38/min and pulse rate of 106/min. Epistaxis and blood tinged epiphora were also observed. The dog kept its head in an extended position and mouth breathing was observed. Auscultation revealed inspiratory dyspnoea without any abnormality in cardiac sounds. Obstruction was noted in the left nostril when a probe was passed.

Exfoliative cytology of aspirated nasal discharge stained with wrights stain revealed clumped together cells with enlarged, hyper chromatic nuclei and pleomorphic cells. The observation was indicative of neoplasm in the nasal cavity.

Cytocristin [1] injection @ 0.025 mg/kg was diluted with 10ml of normal saline and administered as slow I/V. Utmost care was taken during intravenous injection to avoid perivascular entry. Review of the case was made on the 3rd day and to attend side effects, if any and the therapy was repeated on the 8^{th} day.

Results

The dog showed marked clinical improvement by the 3rd day and there were no side effects. Reduction in epistaxis was observed. On the 8^{th} day there was tremendous reduction in epistaxis, epiphora and inspiratory dyspnoea. Repeated the same dose of the drug on the 8th day. By the 16th day the dog was clinically normal. It showed small degrees of anorexia and alopecia during the period of therapy which was responsive to digestive enzymes and skin conditioners. The treatment was stopped after the 2^{nd} dose of injection.

Discussion

The dog showed symptoms like epistaxis, chronic rhinitis, difficulty in respiration and mouth breathing (Leib and Monroc, 1997; Lascelleus, 2000 and Papazoglou, 2001). Exfoliative cytology using aspirated nasal discharge by Wright's staining (Benjamin, 1979) revealed pleomorphic, hyperchromatic clumped cells having enlarged nucleus indicative of neoplasm in the nasal cavity. Vincristine monotherapy at a dose rate of 0.025 mg/kg

[1] *Cytocristin (1 mg/ml): Vincristine (Cipla)*

intravenously was found to be effective (Chickkanakoppu et al., 1993). Epistaxis, dyspneoa and blood tinged epiphora ceased completely and the neoplasm regressed with in two weeks of therapy. Animal showed small degree of alopecia and anorexia during the course of therapy as side effects.

Conclusion

Although nasal neoplasms are not very common in dogs, surgical excision and radio-therapy are difficult (Lascellus, 2000). In such cases chemotherapy with antine-oplastic drugs are effective. It reduces the risk involved in surgical removal and anaesthesia. It causes cure or complete regression, alleviation of symptoms, control of pain for animal and physiological comfort for the owner. (Brander et al., 1993). Hence vincristine is the drug with less side effects that can be used for many malignancies that are difficult to cure through surgical excision.

Reference

1. Brander,G. C., Pugh, D. M., Bywater, R. J. and Jenkins, W. L. (1993) Veterinary Applied Pharmacology and Therapeutics, 5th ed., ELBS Publishers, pp 391-399.

2. Chikkanakoppu, S. D., Vasanth, M. S., Srinivas., G. L., Ranganath, V. N. and Jayadevappa,S (2000). Chemotherapy of Oral Tumours in Canine. Indian Veterinary Journal, 77(6),525-526.

3. Lascelleus, B. D.X., Parry, A. T., Stidworthy, M. F., Dobson, J.H.and Ohita,R.A.S (2000) Squamous Cell Carcinoma In Nasal Planum In 17 dogs. Vetrinary Record, 147(17),473-476

4. Leib, S.M and Monroc, W.E. (1997) Practical Small Animal Internal Medicine, W.B. Saundeers Co. pp 1107-1108.

5. Papazoglou, L. G., Koutinas, A. F., Plenraki, A.G. and Toutis,D. (2001) Primary Intranasal Transmissible Veneral Tumour on Dogs in Retrospective Study of 6 Spontaneous Cases, Journal Of Veterinary Medicine, 48(7), 391-400.

Authors

1. Dr.Laiju M. Philip., 2. Dr.Shihabudheen, P. K. and 3. Dr.Deepak Mathew, D. K., Veterinary Surgeons, Department of Animal Husbandry, Kerala.

JIVA, 6(2):2008

ISOLATION, IDENTIFICATION, ANTIBIOGRAM AND PATHOGENECITY TESTING OF *Klebsiella pneumoniae* FROM A CASE OF PNEUMONIA IN CALF

Aparna S., Krishnan Nair G. & Mini M.

Introduction

Pneumonia, often of a multifactorial etiology continues to be an important health problem in calves. *Klebsiella pneumoniae* are opportunistic pathogens and are associated with respiratory infections in a wide variety of species. Allan(1977) reported *Klebsiella sp.* as one of the causative agents of respiratory tract infections in calves. The present study deals with a case of death caused by pneumonia in a calf where *Klebsiella pneumoniae* was identified as the pathogen involved.

Materials and Methods

A calf died of respiratory disease was presented for postmortem. The postmortem lesions observed were petechiae in liver and pericardium, congestion of lungs and spleen, and marked pneumonia. Representative portions of lung tissue showing pneumonic lesions were collected aseptically and carried to laboratory preserved over ice. Loops full of lung tissue were inoculated onto blood agar and incubated at 37^{0}C for 24h under aerobic and microaerophilic conditions. The bacteria isolated was further identified as per Barrow and Feltham(1993) and Quinn *et al.(*2002). Antibiotic sensitivity was done as per the standard single disc diffusion of Bauer *et al.*(1966) against 12 antimicrobials. Pathogenecity testing of the isolate was done by inoculating Swiss albino mice of six to eight weeks of age intraperitonealy with 0.2ml of inoculum containing approximately 3x10^{8}organisms/ ml in sterile normal saline. Control mice were inoculated with 0.2 ml of sterile normal saline.

Result

After 24h incubation at 37^{0}c the blood agar revealed white mucoid colonies that were slimy to semifluid in consistency. They were lactose fermenters, producing pink colonies on Mac conkey agar. On EMB agar mucoid colonies with semi fluid consistency was produced. IMViC test gave a result of (-+-+). Urease test was found positive. Details of characterization are given in Table I. The organism was identified as *Klebsiella pneumoniae* in accordance to Barrow and Feltham (1993) and Quinn *et al. (*2002). The isolate was tested for antimicrobial sensitivity and resistance against 12 antimicrobials. The isolate was found sensitive to ampicillin, chloramphenicol, co-trimoxazole, gentamicin, cefotaxim and pefloxacin. Resistance was shown to cloxacillin, amoxicillin, pencillin, streptomycin, oxytetracycline and erythromycin. *Klebsiella pneumoniae* isolate caused death of mice after 72h post inoculation of 0.2mlof 3x10^{8}organisms via intraperitoneal route. On postmortem the gross lesions in the internal organs of dead mice were petechiae in liver and pericardium and congestion of lungs and spleen. The organism could be re-isolated from the heart blood, lung liver and spleen of dead mice. The control mice remained healthy even after 72h post inoculation.

Discussion

Klebsiella pneumoniae has been well documented as an etiologic agent of respiratory tract infections in a wide variety of species. Its isolation in the present study correlates with the findings of Allan (1977), Brisse and Deujkeren (2005). The biochemical characteristics of the isolate were in concordance

Table I: Identification of Klebsiella Pneumoniae

TEST	REACTION
Gram's reaction	Gram –ve
Morphology	Rods
Motility	-ve
Growth in air	+ve
Growth anaerobically	+ve
Growth on Mac Conkey agar	Pink coloured colonies
Haemolysis	+ve
Catalase	+ve
Oxidase	-ve
O/F of glucose	F
Simmon citrate	+ve
Urease	+ve
MR	+ve
VP	-ve
Indole	-ve
Sugar fermentation test	
Adonitol	+ve
Arabinose	+ve
Cellobiose	+ve
Dulcitol	+ve
Inositol	+ve
Lactose	+ve
Maltose	+ve
Mannitol	+ve
Rafinose	+ve
Rhamnose	+ve
Salicin	+ve
Sorbitol	+ve
Sucrose	+ve
Trehalose	+ve
Xylose	+ve

with that of Barrow and Feltham (1993) and Quinn *et al.(*2002). Merchant and Packer (1971) reported that *Klebsiella pneumoniae* produce mucoid colonies which are slimy and semifluid in consistency. High degree of sensitivity of Klebsiella isolates to gentamicin was reported by Eguchi *et. al.* (1988) which was found true also with the isolate obtained in the present study. Perusal of literature has not shown any reference regarding the pathogenecity of *Klebsiella pneumoniae* in mice on intraperitoneal inoculation. However the isolate in the present study was found pathogenic enough to cause death of mice.

Reference

1. Allan, E.M. (1977), Pulmonary bacterial flora of pneumonic and non-pneumonic calves. *Respiratory diseases in cattle*. A seminar in the EEC programme of co-ordination of research on beef production held at Edinburgh, November 8-10 (ed.Martin,W.B), Martinus Nijhoff, London, Pp:347-355
2. Barrow,C.I and Feltham,R.K.A.(1993). *Cowan and Steels Manual for the identification of Medical bacteria.* 3rd edition. Cambridge University press, Pp:331
3. Bauer,A.W., Kirby,W.M.M., Sherris,J.C and T urek,M.(1966). Antibiotic susceptibility testing by a standardised single disc method, *Am.J.Clin.Pathol*.45:493-496.
4. Brisse,S and Deujkeren,E.V.(2005). Identification and antimicrobial susceptibility of 100 *Klebsiella pneumoniae* animal isolates *Vet.Micobiol*.105:307-312
5. Eguchi,M., Kuniyasu,C., Ohmac,K and Kashiwazaki,M.(1988). Drug sensitivity of *Klebsiella pneumoniae* derived from horses.*Jpn.J.Vet.Sci*.50**:**960-962
6. Merchant,I.A and Packer,R.A..(1971). *Text book of Veterinary Bacteriology and virology*.Seventh edition. Iowa University press, Ames, Pp:675
7. Quinn,P.J.,Markey,B.K., Carter,M.E., Donnelly,W.J.C and Leonard, F.C.2002.*Veterinary Microbiology and Microbial Diseases*. Black well Science limited, Oxford, Pp:272

Authors

1. Dr. Aparna, S., Research Assistant, IAH & VB, Palode
2. Dr. Krishnan Nair, G., Professor, Department of Microbiology, COVAS, Thrissur
3. Dr. Mini M., Associate Professor, Department of Microbiology, COVAS, Thrissur

A NOTE ON AIR SAC WORMS AND ITS TREATMENT IN FALCONS

Shihabudheen P.

Introduction

Falcons and falconry have formed an integral part of life in the deserts of the Middle East since ancient times. For Arabs, falconry is an opportunity to go back to desert, where they once belonged and to reunite with a way of life that has already disappeared. Arrival of petrodollar has increased the value of falcons and improved the facility for their breeding, management and medical care. Last year the Sheik of Dubai presented a beautiful Saker Falcon to the Amir of Kuwait and the cost of falcon was 400,000 US Dollars or 2 crore rupees.

One of the important disease conditions seen in the falcons in Middle East is Serratospiculosis. These worms are seen in the air sacs of falcons. So they are called air sac worms or lung worms. There are nine species of this nematode and Serratospiculum seurati is the most common. Though more commonly seen in Saker Falcons, Gyr and Peregrine are also infected.

Life Cycle

Insects like beetles, grass hoppers and locusts acts as intermediate hosts for serratospiculosis. Falcons commonly eat beetles that wander around the perches. Inside the falcons, the beetle is digested and serratospiculum larvae migrate from the stomach to the air sac. In the air sac, these larvae grow into adults (Figure 1) and lay eggs which move to trachea. The coughed up eggs are swallowed and are excreted through faeces. Insects and beetles get infection through ingestion of eggs in infected faeces. In the body of intermediate hosts, the egg develops to filarial larva.

Figure 1: Worms in air-sac

Clinical Manifestation

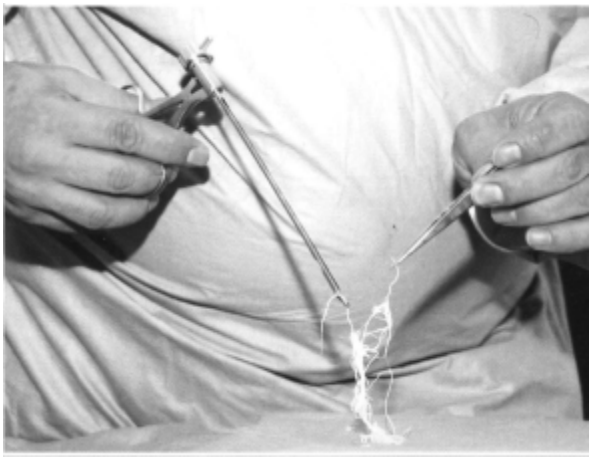
Clinical signs in heavy infestation include dyspnoea, vomiting, reduced speed and strength in flight, weight loss, anorexia/ poor appetite and lethargy. Haemorrhagic nodules are seen in proventriculus as the L3 larva penetrates the wall of the proventriculus and develops in to adult filarial parasite within air sac. Clinical symptoms are not pathognomonic. Smaller number of the parasite usually does not cause any clinical manifestation in falcons.

Figure 2: Isoflurane anaesthesia for endoscopy

Diagnosis

The disease is diagnosed from clinical signs, by detection of ova in faeces or detection of adult worms in air sacs by endoscopy.

Figure 3: Removal of air-sac worms



Treatment

1. Surgical removal of the adult worm with endoscope after isoflurane anaesthesia (Figure 2 and 3).
2. Medical treatment is with filarial adulticide, Melarsomine at the rate of 0.25 mg/kg, IM for 2 days, and 10 days after melarsomine therapy, larvicidal/ ovicidal ivermectin is administered at a dose rate of 1mg/kg IM (This combination of medicines is also effective for Dirofilariasis in Dogs).

In a study conducted in Kuwait, fresh faeces obtained from 1,706 falcons were microscopically examined and 149 samples were positive for serratospiculosis. In 97% cases melarsomine proved fast and effective in eliminating clinical signs and eggs from faeces.

Author

Dr.Shihabudheen Palakkuzhiyil,
Poultry Disease Specialist,
Animal Health Department, Kuwait.
shihabpk2003@yahoo.co.in

A CASE REPORT ON PATHOGENIC MICROFILARIASIS IN CATTLE

Arun G., Mohan M.C., Subash S., Swapna S.A. and Julie B.

Microfilariasis is considered to be non-pathogenic in cattle, unlike in the case of dogs. A case of pathogenic manifestation of microfilariasis in cattle is being reported.

Case report

Three cows in a farmstead in Mannathimoola in Thiruvananthapuram district were reported to be weak and depressed, with reduced milk yield since two weeks. These animals were treated with oral rumenotorics, but there was no improvement. The owner also reported the death of one animal in his farmstead few months back which also exhibited similar signs.

A detailed clinical and laboratory investigation was conducted. The animals appeared dull and depressed with signs of weakness of limbs. Two of them had odema at the hock and fetlock region, which as reported by the owner, disappeared occasionally and reappeared again. Urination and defaecation were reported to be normal. There was mild rise in temperature in two of the animals. Pulse rate and respiratory rate were within normal range in all the animals. In all the animals, both suprascapular and both pre-femoral lymph nodes show mild enlargement. Rumen motility was 2-3/ 5 minutes in all the animals. Whole blood and dung samples were collected for laboratory investigation.

Microscopical examination of dung samples revealed no ova of parasites. Wet film examination revealed microfilaria (++) in all the three samples. Microscopical examination of stained blood smears also revealed microfilariae and was negative for any other blood parasites. There was mild neutrophilia in two of the samples. Haemoglobin level was 6.8gm%, 7.2gm% and 7gm% in the three samples respectively.

The animals were treated with Ivermectin injection[1] subcutaneously at the rate of 200µg/kg body weight. Two of the animals responded the very next day itself with increased feed intake and improvement in general health condition. The other animal also improved in condition by the second day. After about five days, all the animals were back to their normal health status.

Similar confirmed cases were again reported in the same locality and all of them responded to treatment with Ivermectin.

Discussion

Microfilaria seen in blood of cattle, is usually of Setaria (Dunn, 1978 and Aeillo, 1998) However, the microfilariae are considered to be non-pathogenic in cattle (Aeillo, 1998). The presence of large of number of microfilarial organisms in blood and response of all the animals to ivermectin therapy clearly suggests that the animals were affected due to the presence of microfilarial organisms. Clinical signs observed by Bino Sunder et. al. (2003) in clinical microfilariasis by Setaria in cows were weakness, debility, fluctuating temperature, drop in milk yield, respiratory distress, hindlimb weakness and dysentery and was similar to the clinical findings of this case study. Circumstantial evidence show that death of one cow of the same owner few months back exhibiting similar symptoms could also have been due to microfilariasis. All the animals responded to treatment with Ivermectin, which is considered as the drug of choice for microfilariasis (Sharma, 1991 and Satish, 1996).

Therefore, it could be concluded that microfilariasis in cattle cannot be considered absolutely non-pathogenic. Perhaps the pathogenicity of microfilaria vary with the degree of infection/ level

[1] Inj. Neomec 1%w/v, Intas Pharmaceuticals Ltd., Ahmedabad

of microfilarial organisms in blood of affected animals. Further studies need to be conducted to assess the prevalence of this disease in ruminants.

References

1. Aeillo, S.E. (1998). CNS diseases caused by Helminths and arthropods, the Merck Veterinary Manual. Merck and Co., Inc., USA. pp. 883-975

2. Bino Sundar, S.T., D'Souza. P.E. and Jagannath, M.S. (2003). Clinical microfilariosis by Setaria in cows and its successful treatment with doramectin. Indian J. Vet. Med: 23(2): 121-122

3. Dunn, A.M. (1978). Veterinary Helminthology, II ed. William Heinemann Medical Books Ltd. pp. 76-82

4. Sharma, S.P. (1991). Treatment of clinical microfilariasis in buffaloes with ivermectin. Indian Vet J. 68: 972-974

5. Satish, U.D.(1996). Clinico-therapeutic studies on microfilariasis in buffaloes. PhD thesis. Andhra Pradesh Agricultural University, Hyderabad

Authors

1. Dr.Arun George, Veterinary Surgeon, CDIO, Palode
2. Dr.Mohan M.C., Disease Investigation Officer, Palode
3. Dr.Subash S., Veterinary Surgeon, Veterinary Dispensary, Mannathimoola
4. Dr.Swapna Susan Abraham, Veterinary Surgeon, CDIO, Palode
5. Dr.Julie B., Veterinary Surgeon, CDIO, Palode