Preventive Medicine in Cattle Production

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Editor's Note: This report was prepared by Mr. A. H. Andrews, B.Vet.Med., M.R.C.V.S., Honorary Secretary of BCVA, following the Preventive Medicine Symposium which was held at Sutton Bonnington, England, on April 13-15, 1977. The report was also published in the newspaper *Veterinary Practice* and is reprinted here accordingly by permission of the author.

The British Cattle Veterinary Association April meeting took the form of a three day conference under the general theme of Preventive Medicine. It was not possible in so short a time to do justice to such a diverse subject and so the scientific content took the form of introducing new developments on various agricultural topics as well as a session on how people actually perform preventive medicine. Much talk over the past few years has been concerned with the theory of preventive medicine, much less time has been devoted to what is and can practically be done at farm level. Over ninety people attended the meeting each day which perhaps suggests the importance the veterinary profession, in general, places on this subject.

The president of the BCVA (I.D. Baker) welcomed all to the meeting on the evening of Wednesday 13th April, 1977, and handed over chairmanship of the session to R.W.J. Plenderleith (senior vice president). The first talk was by Professor G.E. Lamming (University of Nottingham) entitled "The Control of Ovulation in Cattle." He introduced the subject by saying 66% of national agriculture was based on livestock and 50% of income was from cattle (beef and dairy). The normal oestrous cycle was of 20-21 days duration. Prior to oestrus there was a drop in blood progesterone level and a rise in oestrogen and luteinising hormone. Progesterone rose 5-7 days after oestrus, soon reached a peak and remained so until day 16 or 17 of the cycle. Most methods of ovulation control were either by extending the progesterone phase or luteolysis. However, if the oestrous pattern was abnormal then control might not be successful. Milk progesterone levels were of value in monitoring such abnormalities. Detection of the first oestrus in a 300-cow dairy herd was 29.5%, but even after the fourth cycle it remained almost static at about 86%. The reasons for the interval to first service in dairy cows being greater than 80 days included missed oestrus in 61.7%, delayed start of ovulation 13.3%, cessation of oestrus 10.0%, persistent corpus luteus 3.3%. If anoestrus cows were given gonadotrophin releaser hormone (GNRH), there followed an ovulation normally without oestrus, but the second ovulation was usually related to a normal fertile oestrus. Progestagen intravaginal device (PRID) could also be of use in anoestrus animals causing cyclic activity with a good fertility at the second oestrus. In beef herds there was a longer delay in a return to oestrous activity following calving than in dairy herds and this was due to the effect of suckling. Thus, it was found luteinising hormone response in the first 20 days following partum of beef cows was low and use of GNRH at this time was not followed by cyclic activity. However, in the dairy cow the hypothalamus was responsive to GNRH after 6 to 8 days. The use of PRID also appeared to work at about the same time in both types of cattle.

M.H. Hinton (Bristol Veterinary School) then read a paper on "Experience with Prostaglandins in Veterinary Practice" prepared by R.T. Pepper (Lewes, Sussex) who was prevented from attending the meeting by family illness. He outlined the ways in which prostaglandins were useful. He considered that the double injection technique with fixed time insemination could be used as a substitute for oestrous detection. It appeared only to be justified in beef herds and groups of dairy heifers. The main advantages were the use of superior bulls and better concentration of calvings. The overall success rate was generally in excess of 50% calving and animals were now being more carefully selected as to condition, evidence of oestrus, and flushing with concentrates for 6 weeks around the time of service. The second use of prostaglandins was as an agent for oestrous detection. As prostaglandins were only effective in cycling animals, it was therefore logical to perform a rectal examination prior to therapy. Normally only about 50% were ready for treatment at any one time. Comparing the costs of prostaglandin and the use of heat detectors, the former could be justified if otherwise calving interval would be greater than 365 days. Prostaglandins' third main application was therapeutically. They worked in cases of cystic ovaries containing luteal tissue; in pyometritis and chronic endometritis, particularly if treatment with

15 mg stilboestrol diproprionate had failed; unwanted pregnancies could be terminated before 120 days.

"Experience with Progestagens in Veterinary Practice" was discussed by **I.D. Baker (Aylesbury, Bucks)**. A system involving the use of the synthetic progestagen, Norgestomet, manufactured by G.D. Searle and Co., was described. This involved a subcutaneous implant in the ear and a simultaneous injection of sesame oil containing oestradiol valerate and 10 mg progestin. The implant was removed after 9 days and then fixed time insemination took place 48 and 72 hours after removal. It was suggested that in all cases a timetable be set out for the farm which not only included the implantation and insemination procedures, but also a farm meeting 6 weeks earlier to discuss herd health, nutrition and management. Animals must be cycling and have a good weight for age. A condition score of 3 was ideal and feeding should be for maintenance plus 2 lbs. body weight gain in heifers or 2 gallons of the milk in suckler cows. Feeding should commence 6 weeks prior to the treatment date. It was also important to note if many animals were to be inseminated then it was better for there to be two inseminators and each do 4 or 5 and then have a rest. The overall pregnancy rate in three herds performed by the Aylesbury practice was 64%. However, one herd was done on two occasions, the first time the farmer followed the advice given and the pregnancy rate was 71%, but the following year he did everything wrong and this resulted in only 32% conceiving. There were no disadvantages in inserting the implant as long as the animals were adequately restrained. However, early oestrus did occur in some cattle before removal (8%) and more time was required than in administering prostaglandin. In addition, one procedure had to be undertaken on a weekend, and the compound was not available on the commercial market. Its great advantage was that should, by chance, the cow be in calf no abortion resulted.

The three speakers were then joined for the general discussion by **R.G. Eddy (Shepton Mallet, Somerset),** who made a few observations on the use of prostaglandins. He considered the compounds were the first effective treatment for luteal cysts. Its use in suboestrus and no visible oestrus cows produced an overall 66% success rate. Some dairy herds required a very tight calving pattern to aid their management and prostaglandins were of use in this situation.

The programme for Thursday 14th April was chaired by I.D. Baker, and began with a talk on "The Mode of Action of Anabolic Steroids–Some Thoughts" by **Dr. P.J. Buttery (University of Nottingham)**. He commenced by saying that little was still known about the action of these agents although recent work had resulted in circumstantial evidence which could lead to speculation. He commented that the old British Railways steam locomotive was more efficient than an animal producing protein. Experimentally, an animal was 50% efficient in its ability to use energy to produce carcass weight. In consequent, there was much room for improvement. The younger animal was nearer the ideal than the older one. Protein was constantly undergoing synthesis and degradation. Increased protein in the body can thus result from decreasing protein degradation or raising protein synthesis. Work on trienbolone acetate showed that it had little effect in the male animal but when oestradiol was added then it worked. Studies had also shown that trienbolone acetate increased protein synthesis in liver but it decreased it in muscle. Thus, it would seem this particular compound worked by decreasing protein degradation thereby reducing energy requirements and making the animal more efficient.

D. G. McBeath (Hoechst UK Ltd.) discussed "New Applications of the Use of Fenbendazole in Sheep and Cattle." In general only 1 out of 2000 newly synthesised compounds was ever marketed and of these only one in 3 or 4 payed for themselves. The success rate could however be increased by searching for variations of compounds of known use. Thiabendazole was a compound found to have wide anthelmintic properties. Subsequently, others have been found of similar basic structure and marketed. These included fenbendazole. Early studies with this anthelmintic showed activity against the scolices and segments of the sheep tapeworm, *Moniezia expansa*, but they were inconclusive. A recent trial involving two flocks on a Northamptonshire farm showed fenbendazole eliminated *Moniezia* infections from lambs and indirectly reduced blowfly strike, probably by a reduction in scouring. Treatment of ewes in late pregnancy with the anthelmintic reduced the post-parturient rise in faecal egg count and positive contamination. To reduce handling, the possibility of incorporating fenbendazole in a concentrate pellet and in feed blocks was investigated. In the latter formulation it was considered a therpeutic dose would be obtained over 7 to 10 days. Lambs treated in this way had effective worm control and increased weight gains. The use of fenbendazole incorporated in feedblocks for cattle was also studied including its efficacy in Type II ostertagiasis infestation. Its efficiency in both experimental and naturally occurring infection was similar to a single oral dose. It had been suggested that fenbendazole might be too efficient in killing *Dictyocaulus viviparus* in that, in heavy infestations, the anthelmintic might cause massive killing of the parasite and a subsequent foreign body reaction. In a trial where heavy husk infections were experimentally given, this reaction was not observed although control calves became moribund.

The remainder of the morning was devoted to a session on mastitis. The first paper was "Application of Ionic Composition of Milk to Detect Mastitis" by **Dr. M. Peaker (Institute of Animal Physiology, Babraham).** Mastitis influenced the permeability of the alveoli thereby increasing milk, sodium, chloride, bicarbonate and pH and decreasing the lactose present. The overall effect was a change in conductivity.

In systemic conditions such as illness, hypocalcaemia and oestrus, the udder might be affected and the milk from all quarters would be influenced. However, in mastitis, only the conductivity of milk from the infected quarter was affected and could be compared with that of the other quarters. Conductivity could be measured by means of a Wheatstone bridge and it was best to do an out of balance three-way method to detect cases of both severely and mildly infected quarters. Daily monitoring was the most successful way of using the system, but a single sample using the three-way method could identify 100% of the uninfected cows, 62% of the mildly infected cows, and 93% of the severely infected cattle. Problems in use of the system included fat content of the milk, temperature of the milk, antibiotic treatment and systemic conditions. Late lactation influenced conductivity and so the system was not used in cattle calved over 305 days.

M. Huntbach (Penley, Clwyd) then showed the audience a commercially available machine known as the Cull Master. This provided a continuous monitor of the milk from all four quarters during milking. Changes in conductivity were noted by means of a light and noise system. The apparatus was about 91% accurate in detecting cows with severely infected quarters.

J.M. Booth (Milk Marketing Board Veterinary Research Unit, Worcester) then discussed "Mastitis Cell Counting." Although the first paper on the use of cell counts to detect mastitis was published in 1910, it was not until the Coulter Counter became available that interest in the method greatly increased. It allowed rapid determination and better repeatability, but the machines needed accurate standardization. Thus, in one trial a sample with 400,000 cells/cc had been found by other laboratories to have over a million cells. Most of the work of the MMB was concerned with bulk herd samples although about 10,000 cow and quarter samples were tested a year. Frequently the quarter samples in a herd were requested by the veterinary surgeon as a prelude to bacteriological screening. Cell counts varied according to region but were highest in the South East. He also disclosed that as from now bulk milk cell counts were being undertaken for all herds in the country. As from July, all farmers would be receiving regularly this information on their cell count and a rolling average. One problem with bulk cell counts was obtaining cell counts which were representative of the milk, in addition the stage of lactation influenced the count, as well as a stress such as change of housing, climate, etc. He considered animal bulk herd cell counts of 300,000 or less showed a low sub-clinical level of mastitis, 300,000 to 500,000 cells had a medium level of mastitis, 500,000 to 700,000 cells had medium to high level, 700,000 to a million had a high level and over a million a very high level. 10% of herds had over a million cells per cc in their milk. Cell counts were now used in Europe as a measure of the quality of the milk. However, it was possible that under EEC legislation a penalty system might be applied to farmers whose herds produced cell counts over a certain level on two consecutive monthly samples. The level at present was still being discussed as well as the implementation of such a scheme. It was also interesting that the national cell count had remained almost constant from 1972-1974, but then reduced in 1975 and still further in 1976. However, in 1977 it was again starting to rise. It is salutary that the reason for the improvement in 1975 and 1976 had nothing to do with the attempts of veterinary surgeons to make their clients aware of mastitis, but the price for cull cows! A very vigorous discussion on the mastitis session then followed and was opened by **D.A.K. Thornton (Alresford, Hampshire)**.

The MAFF Veterinary Investigation Centre at Sutton Bonnington mounted several displays and demonstrations both at the centre itself and the university during the afternoon. The exhibits included a display of plants causing brassica poisoning and suggested methods of feeding such plants to prevent the risk of trouble; the epidemiology of bovine ostertagiasis was demonstrated by **Dr. S.N. Chiejina**; a survey of blood lead levels in Derbyshire as well as materials which result in acute poisoning; nitrate/nitrite poisoning of adult cattle and methods of detection was presented by **T. Jones**; and environmental salmonella and methods used for their culture was demonstrated by the DVO, **F.G. Clegg**.

The subject of "Housing of Beef Cattle" was talked by **R.B. Osborne (Meat and Livestock Commission, Bletchley, Milton Keynes)**. He considered the major reason for housing cattle was to prevent land poaching. Factors to be considered when erecting a building included method of dung disposal, how feeding was to be managed, ventilation and cost. Space allowances for animals could be given but were rather empirical, the tighter the system the more manure and straw required unless slats were used. When housing bulls for beef there was a very rigid MAFF code of practice for handling. These cattle were often kept housed on slats and fairly tightly penned in groups of 20 or less. The space allowances for suckler herds were discussed and in particular the fact that the autumn calving herd needed more space because of the calves which would be born and to possibly allow the introduction of bulls. He then described various types of housing including controlled environment and climatic housing for calves, and hardening of accommodation. The types of housing of beef cattle were considered and it was suggested that a 60 feet house was the widest that could be conveniently ventilated. If automatic feeding was used then a system of feeding when the equipment broke down was essential. Cubicles in kennel housing can be used, as also the Masstock-type house which was one of the few standard beef cattle houses. Other methods include the deep cellar and the topless cubicle. The second half of the talk concerned ventilation and it was stated that the ideal airflow requirement through a building was not known. The limiting factors were the minimum ventilation rate for health and the maximum ventilation rate without cold, stress, etc. Up to 10 years ago 0.5 cu. ft. per minute per lb. bodyweight was thought to be the standard maximum, however now it was considered there was the need for more air by making buildings more open. Ventilation outlets should be of about 0.8 sq. ft./head and the outlet 0.5 sq. ft./head with an eaves height of about 12 feet, a roof pitch of greater than 15° and a width of less than 60 ft. Gap boarding was of use in providing inlet on the side walls and a continuous opening at the ridge was desirable. Only very short buildings could be adequately ventilated from the end.

Professor P.N. Wilson (BOCM Silcock Ltd., Basingstoke) then spoke on "Inter-relationships Between Nutrients:Feed:Milk:Money." The farmer often knew how milk translated into money but not always how it converted to profits. In the future profit margins would be tighter and so all the inputs would need to be optimised. Feed was a convenient form for introducing nutrients to a cow. There were few other attributes to it but one important factor was palatibility. Although the cow exhibited marked seasonal fluctuations in yield it was really nutrition rather than the season which was the cause. He pointed out that there were several ways of calculating feed for a litre of milk. It could be calculated by dividing the total concentrates by total milk produced. This gave a low figure in most herds part of milk production was from grass or conserved grass. Secondly, it could be calculated by sorting herds according to their yields (i.e., according to their genetic potential) and the lowest yielding compared with the highest, and was probably the best method. Thirdly, it could be found by comparing concentrate usage and comparing the lowest concentrate usage with the highest. This arranged herds by their inputs and did not take into account the value of grass or genetic potential. The two most sensitive parameters affecting profitability from milk were the cost of feed and the value of milk. The ratio had fallen from a steady 2.4 before 1972/73 to only 1.75 in 1973/74, and was 2.00 in 1974/75, whereas in the USA it normally averaged 3.5. It was logically possible that a time could come when the milk/feed cost ratio would reach equilibrium. At present feed prices and using 0.4 kg/litre milk then it paid to increase milk outputs provided cows and management had the capabilities. However, it had to be remembered that every cow had a maximum genetic potential above which it would not be profitable to increase food input.

The third day was chaired by the newly installed **BCVA President, M.H. Hinton**, and began with the showing of the film "Husk" which described the signs of this parasitic disease and the most likely conditions under which it was contracted. In addition, it demonstrated how best to use the X-irradiated oral vaccine of third stage *Dictyocaulus viviparus* in both the calves reared from the dairy herd as well as the suckler herd. **R. Peacock (Allen & Hanburys Ltd., Ware)** was present to answer the many questions which arose from the film.

Dr. H. Swan (University of Nottingham) then spoke on "Developments in Cattle Nutrition." The amount of food eaten depended on the digestibility of the ration, but if this digestibility increased above 67% then the animal tended to moderate its intake to be comparable with its physiological requirements. Rations of lower digestibility than 67% were fed to upland cattle, store beef animals and dairy cows of low yield. Above 67% digestible food was mainly given to dairy cows and it was necessary to try and overcome the homeostatic mechanism to increase food intake. The range of metabolisable energies of foods on a dry matter basis was small and when current prices for feeds were examined straw was a good buy. This resulted in a search for systems allowing the use of straw in a more digestible form. This had included the use of sodium hydroxide treated straw, which increased the digestibility to that of medium quality hay. However, there was the problem of the treated straw being alkaline the sodium ions had to be expelled and this might result in soil disturbances. Dr. Swan then said that increase in protein diets would not result in increased body weight unless sufficient energy was also provided.

He claimed that half the protein imported into Britain was wasted and literally went down the drain. In one experiment where two levels of crude protein were used (10% and 14%) the better results were obtained for each protein level on a starch diet rather than a cellulose one. He suggested that the reason why anabolic steroids were not effective in bulls was because not enough digestible crude protein was provided. He also stated that in the dairy cow there was a different response in a cow to a high level of feeding depending on the stage of lactation. Prior to 60 days the animal was governed by the udder, and the cow utilized its own body fats to produce milk. After 60 days the intensity of metabolism changed and the cow converted less to milk and more into body tissue. This was to conserve the species. It was considered even in the dairy cow at least 20% of diet should be in the form of fibres; however, the digestibility of fibre should be varied. Thus, in the first 60 days of lactation it should be quality hay, in mid lactation silage should be used, followed by straw at the end of lactation.

A.J. Stephens (Reading University) then discussed "Computerised Practice Accounting and Its Application." Although an application for computers had been found in almost every field of human activity, few were at present used by the veterinary profession. In Denmark, a group of veterinary surgeons founded the Accounting Association of Practising Danish Veterinarians, and started a system of computerised practice accounting on a basic computer

ANNOUNCING

LASIX® (furosemide) BOL-O-TABS® (2 g)

Single-entity diuretic therapy for the treatment of udder edema. An effective alternative to thiazide-steroid combinations.

A SOLID companion to LASIX® (furosemide) Injection 5% (50 mg/ml)

Prompt removal of edema.
Following administration of LASIX BOL-O-TABS a diuresis usually ensues within two hours.

Proven effectiveness.
Well-documented clinical trials reported good to excellent results in over 90% of the cases treated with LASIX BOL-O-TABS.

No risk of abortion.
Unlike thiazide-steroid combinations, LASIX BOL-O-TABS can be used safely during the third trimester. However, it is not recommended for use during the second trimester.

High margin of safety.
The single-entity therapy of LASIX BOL-O-TABS eliminates the steroid side effects and risks associated with thiazide-steroid combinations. However, the veterinarian should be alert to the usual diuretic warnings, precautions and contraindications.

Rapid therapeutic action.
Average duration of treatment is 2½ days, compared to 3-4 days for thiazide or thiazide-steroid combinations.

See next page for prescribing information.

FOR VETERINARY USE ONLY

LASIX®
(furosemide)
BOL-O-TABS®

A diuretic-saluretic for prompt relief of edema.

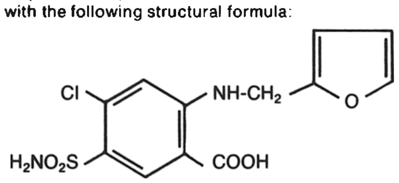
CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

DESCRIPTION

Lasix® (furosemide) is a chemically distinct diuretic and saluretic pharmacodynamically characterized by the following:

1) A high degree of efficacy, low-inherent toxicity and a high therapeutic index.
2) A rapid onset of action and of comparatively short duration.[1,2]
3) A pharmacologic action in the functional area of the nephron, i.e., proximal and distal tubules and the ascending limb of the loop of Henle.[2-4]
4) A dose-response relationship and a ratio of minimum to maximum effective dose range greater than tenfold.[1,2]
5) It may be administered orally or parenterally. It is readily absorbed from the intestinal tract and well tolerated. The intravenous route produces the most rapid diuretic response.

Lasix® (furosemide), a diuretic, is an anthranilic acid derivative with the following structural formula:



Generic name: Furosemide (except in United Kingdom – frusemide). Chemical name: 4-chloro-N-furfuryl-5-sulfamoylanthranilic acid.

ACTIONS

The therapeutic efficacy of Lasix® (furosemide) is from the activity of the intact and unaltered molecule throughout the nephron, inhibiting the reabsorption of sodium not only in the proximal and distal tubule but also in the ascending limb of the loop of Henle. The prompt onset of action is a result of the drug's rapid absorption and a poor lipid solubility. The low lipid solubility and a rapid renal excretion minimize the possibility of its accumulation in tissues and organs or crystalluria. Lasix® (furosemide) has no inhibitory effect on carbonic anhydrase or aldosterone activity in the distal tubule. The drug possesses diuretic activity in presence of either acidosis or alkalosis.[1-7]

INDICATIONS

Cattle:
Lasix® (furosemide) is indicated for the treatment of physiologic parturient edema of the mammary gland and associated structures.

CONTRAINDICATIONS – PRECAUTIONS

Lasix® (furosemide) is a highly effective diuretic-saluretic which, if given in excessive amounts, may result in dehydration and electrolyte imbalance. Therefore, the dosage and schedule may have to be adjusted to the patient's needs. The animal should be observed for early signs of electrolyte imbalance, and corrective measures administered. Early signs of electrolyte imbalance are increased thirst, lethargy, drowsiness or restlessness, fatigue, oliguria, gastrointestinal disturbances and tachycardia. Special attention should be given to potassium levels. Lasix® (furosemide) may lower serum calcium levels and cause tetany in rare cases of animals having an existing hypocalcemic tendency.[10-14]

Although diabetes mellitus is a rarely reported disease in animals, active or latent diabetes mellitus may on rare occasions be exacerbated by Lasix® (furosemide).

Electrolyte balance should be monitored prior to surgery in patients receiving Lasix® (furosemide). Imbalances must be corrected by administration of suitable fluid therapy.

Lasix® (furosemide) is contraindicated in anuria. Therapy should be discontinued in cases of progressive renal disease if increasing azotemia and oliguria occur during the treatment. Sudden alterations of fluid and electrolyte imbalance in an animal with cirrhosis may precipitate hepatic coma; therefore, observation during period of therapy is necessary. In hepatic coma and in states of electrolyte depletion, therapy should not be instituted until the basic condition is improved or corrected. Potassium supplementation may be necessary in cases routinely treated with potassium-depleting steroids.

WARNINGS

Lasix® (furosemide) is a highly effective diuretic and, as with any diuretic, if given in excessive amounts may lead to excessive diuresis that could result in electrolyte imbalance, dehydration and reduction of plasma volume, enhancing the risk of circulatory collapse, thrombosis and embolism. Therefore, the animal should be observed for early signs of fluid depletion with electrolyte imbalance, and corrective measures administered. Excessive loss of potassium in patients receiving digitalis or its glycosides may precipitate digitalis toxicity. Caution should be exercised in animals administered potassium-depleting steroids.

Sulfonamide diuretics have been reported to decrease arterial responsiveness to pressor amines and to enhance the effect of tubocurarine. Caution should be exercised in administering curare or its derivatives to patients undergoing therapy with Lasix® (furosemide) and it is advisable to discontinue Lasix® (furosemide) for one day prior to any elective surgery.

CATTLE: Milk taken from animals during treatment and for 48 hours (four milkings) after the last treatment must not be used for food. Cattle must not be slaughtered for food within 48 hours following last treatment.

DOSAGE AND ADMINISTRATION

The usual dose of Lasix® (furosemide) is 1 to 2 mg/lb body weight (approximately 2.5 to 5 mg/kg). A prompt diuresis usually ensues from the initial treatment. Diuresis may be initiated with Lasix® (furosemide) Injection 5% and maintained by oral treatment following a 12-hour interval.

DOSAGE:
Oral: CATTLE
One 2 g bolus daily.
Treatment not to exceed 48 hours postparturition.

Parenteral: CATTLE
The individual dose administered intramuscularly or intravenously is 500 mg (10 ml) once daily or 250 mg (5 ml) twice daily at 12-hour intervals. **Treatment not to exceed 48 hours postparturition.**

Milk taken from animals during treatment and for 48 hours (four milkings) after the last treatment must not be used for food. Cattle must not be slaughtered for food within 48 hours following last treatment.

Instructions for use of Lasix® (furosemide) in other animal species are included with dosage forms designed for that purpose.

HOW SUPPLIED

Parenteral:
Lasix® (furosemide) Injection 5% (50 mg/ml)
Each ml contains: 50 mg furosemide as a diethanolamine salt preserved and stabilized with myristyl-gamma-picolinium chloride 0.02%, EDTA sodium 0.1%, sodium sulfite 0.1% with sodium chloride 0.2% in distilled water, pH adjusted with sodium hydroxide.
Available in 50 ml multidose vials.
Oral:
Lasix® (furosemide) 2 g Bol-O-Tabs®
Each bolus contains 2 g of furosemide: 4-chloro-N-furfuryl-5-sulfamoylanthranilic acid.

Available in boxes with 12 Bol-O-Tabs® each.
Store at controlled room temperature (59°-86°F).
Avoid exposure to light.
Tablets with 50 mg or 12.5 mg each are available for use in small animals.

TOXICOLOGY

Acute Toxicity:
The following table illustrates low acute toxicity of Lasix® (furosemide) in three different species. (Two values indicate two different studies.)

LD_{50} of Lasix® (furosemide) in mg/kg body weight

SPECIES	ORAL	INTRAVENOUS
Mouse	1050-1500	308
Rat	2650-4600*	680
Dog	>1000 and >4640	>300 and >464

*NOTE: The lower value for the rat oral LD_{50} was obtained in a group of fasted animals; the higher figure is from a study performed in fed rats.

Toxic doses lead to convulsions, ataxia, paralysis and collapse. Animals surviving toxic dosages may become dehydrated and depleted of electrolytes due to the massive diuresis and saluresis.

Chronic Toxicity:
Chronic toxicity studies with Lasix® (furosemide) were done in a one-year study in rats and dogs. In a one-year study in rats, renal tubular degeneration occurred with all doses higher than 50 mg/kg. A six-month study in dogs revealed calcification and scarring of the renal parenchyma at all doses above 10 mg/kg.

Reproductive Studies:
Reproductive studies were conducted in mice, rats and rabbits. Only in rabbits administered high doses (equivalent to 10 to 25 times the recommended average dose of 2 mg/kg for dogs, cats, horses, and cattle) of furosemide during the second trimester period did unexplained maternal deaths and abortions occur. The administration of Lasix® (furosemide) is not recommended during the second trimester of pregnancy.

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Lasix® (furosemide) 2g Bol-O-Tabs®
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system in 1967. It began as a method to ease the burden of practice accounting by using the speed and accuracy of the electronic computer. Its purpose was to produce bills, client outstanding accounts and settle the accounts of the veterinarian. The computer programmes were developed under a contractual agreement by the Agricultural Computing Centre and this also processed information from other related agricultural sources. It became obvious that a large amount of data capable of usage in epidemiological studies was being obtained. In addition, linking the disease data with that of other organizations using the data bank could result in insights into the inter-relationships of feeding, productivity, disease, husbandry practices, breeding agronomy and profitability for individual farms, regions, etc. The new programme was due to become fully operational in March 1977. The discussion that followed included contributions from members either with a computer or utilizing computer service agencies.

The remainder of the programme was concerned with a session on Preventive Medicine in Practice, in which the speakers had been asked to tell exactly what they performed in the way of preventive medicine when they were actually on the farm.

First speaker was **R.G. Eddy (Shepton Mallet, Somerset)** who described "Routine Approach to Fertility and Infertility in Dairy Cows." The factors influencing interval to first service were farm policy, uterine involution and oestrous detection, and those affecting first service to conception interval were oestrous detection and conception rate. In his own practice, 24 herds were visited on a routine basis, seven at weekly intervals, 16 fortnightly and one monthly. In total 3500 cows which represented 15% of the cattle in the practice. Routine visits maintained the stimulus of oestrous detection. Various routine treatments which influenced infertility were then outlined. Records were most important and should record calving dates, bulling with no service, service dates and bull used, pregnancy diagnosis dates and result, drying off and culling with reasons. It was essential to identify which cattle needed current attention. This could be done in a number of ways including rotary wall boards, etc. Indices then should be calculated on historical performance and compared with targets. The effects of oestrous detection on calving to first service interval were discussed. Various types of recording system were reviewed including individual record cards which were useful in herds under 100 cows, computer based record systems, wall charts, and the CuSum technique.

R.W. Blowey (Gloucester) discussed "Preventive Medicine in Dairy Herds." He considered there was a need of a genuine interest to increase productivity and profitability for preventive medicine to be of value. Fertility control programmes provided one's entry to the farm. He then outlined some of the procedures undertaken by his practice. Nutritional monitoring was important and involved taking blood samples from 6 or 7 cows at monthly intervals about 4 to 8 weeks after calving. Glucose, urea and albumin were analysed and less frequently minerals, ketones and haemoglobin. The feed was also assessed with regard to quality and quantity. In addition, the yield decline of cows 90 days or more after calving was monitored, and total milk production and quality assessed. Lameness control was only enforced when the incidence was high. Measures included the use of a foot bath, routine foot trimming, culling persistent offenders, avoiding gravel tracks, attention to concrete and keeping yards clean. Excessive post-parturient paresis and retained foetal membranes were dealt with by analysis of records, relating incidence to age, family of cow, season, etc., blood sampling, analysis of forage and examination of the general condition of cows. Control of mastitis included bacteriological samples, use of CMT test, control of antibiotics allowed to the farmer, assessment of teat end damage, milking machine testing, collecting cell count data and double dry cow therapy in those herds with high incidence of down calving mastitis. Young stock control was mainly covered by circulars which discussed such things as when vaccination was due, anthelmintic treatment, warnings of high worm and fluke possibility. In addition, young stock were appraised when performing other routine operations. It also had to be bourne in mind what the farmer's requirements were.

R.S. Cowie (Keith, Grampian) talked about "Preventive Medicine in Beef Herds" in a part of the country with "seven months winter and 165 days of bad weather." He considered in the beef cow operation, 90% of calf health was dependent on cow health. Preventive medicine was launched from basic principles, and often a team effort was essential with the veterinary surgeon acting as co-ordinator. He selected the objectives for immediate action, action next year and future action. He then outlined the possible causes of trouble. Housing was concerned with improving the living conditions of the animal, the management of the herd, the lot of the stockman and the rationing of stock. Unfortunately, it frequently did not live up to requirements often because of overcrowding. Management could present problems as with summer mastitis due to a change in the dry period or a short dry period could result in poor quality colostrum and milk fever. Hygiene faults formed another category. The biggest factor was probably nutrition. He considered the greatest breakthrough in animal husbandry was to give the cows food in reasonable amounts at the correct time. **If a farmer had a problem during the winter or spring, he was automatically marked down for a preventive medicine visit in about September whether he liked it or not!** Staggers in autumn calvers was due mainly to over estimation of the value of autumn grass. Calf problems were thought of as a complex since predisposing factors would be common to two or more problems. In pneumonia outbreaks in outside calves, two predisposing cases were considered, lice and selenium-vitamin E deficiency. Pregnancy diagnosis was not routinely performed as infertility and calving spread were mainly the result of two factors, namely food or mineral deficiency, or lack of pull power. Toxic substances could cause trouble as carelessness resulted in annual cases of lead poisoning, and moldy foods had to be examined. The breed of cow was also important in that the common Hereford-Friesian cross was not tough enough for that area of Scotland. In conclusion, it was considered that health was the natural state of affairs, and if disease existed then efforts had to be made to discover what was going wrong or what the farmer was doing wrong.

"Preventive Medicine in the Calf Unit" was discussed by **M.J. Nagele (Aylesbury, Bucks)**. He confined his remarks to the rearing of the dairy bred animal from a few days old to a body weight of 110 Kg at 12 weeks old. Such calves had a rough time if at an early stage they were transported often long distances and had a change of environment. If possible the calves should be selected and the standard of the unit, the health status of the calves, their economic viability and technical know-how should be assessed. Colostrum was of great value to the calf, transport if involving dealers was more likely to produce trouble, the environment of the building design was also important as was stockmanship. A visit to the person supplying the calves to the farmer was often useful. On arrival a post-delivery health check should be performed and any unsatisfactory calves rejected. The costing of the enterprise should be known and often the use of a post-entry routine medication was necessary. The upkeep of records was essential as this gave a quick assessment of the health of a calf intake. The policy of all in/all out should be followed and the farmer had to be discouraged from the practice of "topping-up." Between batch cleaning was essential. Feeding had to be regular, and good stockmanship was essential.

The final talk was presented by **F.G. Crooks (farm manage, BOCM Silcock Knaptoft Dairy Centre, Leicestershire)** on "Preventive Medicine - What the Farmer Expects." He began by describing his farm of 300 cows divided into three herds and utilizing 400 acres. The average yield was 1450 gallons with a calving interval of 380 days and a culling rate of 20 per centre. He then described the economics of the enterprise and considered that veterinary costs should amount to 3% of the variable costs. Fertility was monitored by routine weekly veterinary visits to deal with infertile cows and pregnancy diagnosis. Mastitis was tackled by management which involved detailed records, regular plant maintenance, good milking routine, operators utilizing rubber gloves, inspection of fore milk, full treatment of clinical mastitis cases, teat dipping, MMB cell counts, VI facilities for problem cows, and culling chronic cases. Foot troubles were treated by weekly footbaths and trimming which took up four days annually. Metabolic diseases were prevented by frequent feeding. He considered the veterinary surgeon was useful in two different ways, firstly as the fire brigade and secondly for preventive medicine. The latter was mainly to reduce wastage by work in fertility, mastitis control, foot problems, and metabolic disorders. By reducing herd wastage it meant that cattle could be selected for this productivity and profitability, and improved conformation.

There then followed a long discussion before the proceedings were finally brought to a close, perhaps indicating that we all have much to learn about preventive medicine and how best to use it in cattle practice.