British Cattle Veterinary Association
A Report On The 1980 Annual Conference.

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The West Midlands provided the setting for this year's Annual Conference of the British Cattle Veterinary Association which was held at the Shropshire Farm Institute, Baschurch, near Shrewsbury.

The first subject to be discussed was lameness and **Dr. Peter Murphy,** (Wexford, Eire) described *lameness in housed beef cattle.* Prior to entry to the European Economic Community most Irish beef cattle were reared with low energy hay diets on straw bedding; however since joining the EEC, diets had altered to contain more cereal and slatted floors were used. Typically there were 22 sq. ft. per herd with 30 beasts per pen and two feet of trough space per animal. The introduction of slats resulted in increased disease with lameness rising from 24% to 48%. On addition 47% of such problems were severe or extensive as opposed to 8% under the previous system. It had also been shown that bulls had three times as much lameness as heifers although there was no difference between bullocks (steers) and heifers. Older cattle had a higher incidence of problems, and there were more cases of lameness in Charolais (10.0%) than Friesians (6%) or Herefords (3.3%). The type of slat used affected the number of problems and least occurred where the slats had a smooth surface with bevelled edges and were singly cast. After housing on straw most problems occurred in the first 6 weeks and then after 12 weeks when manure began building up. On slats there was a high level over the whole period of housing although many cases occurred in the first three weeks after housing (as a result of adaptation to slats and changes in dominance) or after 13-15 weeks when abrasive lesions of the feet became common.

Sixty-six per cent of all lesions occurred in the hind limbs of the cattle. The location of lesions within the limb on slats and straw were, foot 64%, 60%, interdigital area 9%, 35%, fetlock 14%, 0%, hock 9%, 0%, knee and others 4%, 5% respectively. It was Dr. Murphy's experience that pre-carpal bursitis rarely resulted in lameness. On slats 90% of lesions were traumatic (septic traumatic pododermatitis 43%, cellulitis 21%, bruising of foot 15%, concussive laminitis 6%, tendon and muscle injuries 2%, arthritis 2%, osteitis and fractures 2%) with 10% being foul of the foot. However, 45% of the lesions of cattle on straw were foul of the foot with 35% bruising of the heel, 15% concussive laminitis, and 5% tendon and muscle injuries. The second most common condition on slats, cellulitis, resulted in a rapid spread through the subcutaneous connective tissue and could be treated with trimethoprim and sulphonamide. Two other conditions commonly seen on slats were purulent lymphadenitis of the popliteal lymph node and aseptic epiphysitis of the metatarsal bones. On badly made slats over a time there was abnormal wear, bruising, and overgrowth of the lateral wall. The abnormal weight bearing resulted in white line problems and penetration. When treating septic traumatic pododermatitis, if more than a third of the laminae were exposed, then the foot should be poulticed or pressure bandaged or an orthopaedic shoe applied to the other claw. If the foot was grossly infected amputation should be undertaken. Affected animals should be removed to a bedded area, and if animals were hospitalized for more than three weeks they should not be returned to their original group. Prevention could be obtained by the use of 5% formalin or 10% copper sulphate foot baths twice daily for about 14 days before housing. In addition animals should be hoof trimmed at entry. Once housed the animals should be foot bathed twice daily on two days a week.

Concrete and Lameness - the culprit or the cure was discussed by **Maurice Barnes** (Cement and Concrete Association, Slough). The objectives of a floor for a dairy unit were that it should be non-slip, not too abrasive, warm and dry, cleanable, durable and of low cost. From the research undertaken it seemed smooth floors were worse than rough, cold floors worse than warm, wet floors worse than dry, unbedded floors worse than bedded, solid floors worse than slats, rough slats were worse than good slats, concrete was worse than mattresses, and good trough design prevented undue stress on parts of the foot. Good quality concrete was relatively cheap, durable and easily cleaned, poor quality concrete could be just the same price as good quality but it was easily worn, porous and often abrasive. A concrete surface could be made less slippery by use of a broom, tamping or grooving. Its resistance to wear depended on the concrete mix of cement, sand and granite chippings. Farmers normally use a cement: sand: chipping ratio of 1:2:4 which has a poor resistance to wear and soon breaks up; a better mix was C2OP. Concrete resistance improved with age, thus one with a strength of 30 N/mm^2 at 1 month increased to 36 N/mm^2 at 3 months, 39 N/mm^2 at 1 year and 45 N/mm^2 at 5 years. Mr. Barnes said that for good concrete the base needed preparing. The incorrect cement mix should be used e.g. C2OP or C25P (except silos which required a richer mixture). Extra water should not be used, the concrete should be compacted, textured by tamping or grooving, and cured. Insulated concrete can be obtained by a 1 in 6 no lines concrete; this should be laid at a depth of 150 mm and covered with 50 mm concrete laying both at the same time. When tamping concrete it was essential to see that there was enough concrete at the sides. The use of a broom was considered to be too abrasive, V-shaped grooves in a flat top surface were considered good. After laying new concrete it should be scraped to remove loose sand and stones. Free lime could be removed with a surface hardener, the cheapest of which was sodium silicate.

Dr. David Weaver (Glasgow Veterinary School) brought the lameness session to a close with a plea for the use of more *Clinical Radiology of Lameness* . He said that outside veterinary schools and research institutes, radiography was little used to aid in diagnosis of lameness. The main reasons were that the equipment was cumbersome, the films could not be immediately developed so that if the results were of poor quality a second exposure could be carried out, and also there was a belief that diagnosis could be made without the use of radiography. Conditions such as fracture of the distal phalanx and sequestrum in the medullary cavity of the long bone could only be diagnosed by radiography. Assessment of other cases was better when x-ray plates were obtained e.g. epiphyseal separations and fractures of long bones in calves. Another example of the benefit of radiography was in assessing the likely success of amputation in cases of proximal spread of a septic pedal arthritis where it was not certain whether or not the fetlock joint was involved or it was just a case of severe periarticular cellulitis.

Radiography was also helpful in early cases of joint ill in calves in that it allowed the demonstration of the presence or absence of damage to the cartilage and bony structures in the joint. This could be combined with the examination of synovial fluid. This could be used to estimate total white cell count (normal 300 cells/cu mm - dubious 3000 cells/cu mm) and differential white cell count (neutrophils in normal 10%, infected 90-95%). The synovial fluid also tended to be floccular. Radiographic apparatus is now available which is sufficiently portable for farm use and which does not cost more than a good pedigree animal. It is possible under xylazine sedation using fast films to obtain acceptable plates of the digits, fetlock, carpus and hock with exposures of 0.1 second.

The second session dealt with the liver and the practitioners' side was described by **Dr. Roger Blowey** (Gloucester) with thoughts on *Clinical Disease* . He described the various clinical syndromes which he believed involved the liver. Liver diseases included toxaemias, including coli mastitis, poisoning, liver fluke, copper deficiency and excess, ragwort, photosensitisation and liver failure. Liver failure included the non-responsive post parturient cow, recurrent hypocalcaemic cases, overeating concentrates, photosensitisation, and poor conception rates. In the recumbent cow there were two syndromes, depressive and hyperexcitability. In the depressive form the animal had a fast puse and was dull, whereas in the hyperexcitable one the animal swung its head about, but in both conditions the udder was slack, eyes sunken and the rectum was empty. Such animals often had normal calcium and magnesium levels, phosphorus levels were often low, the SGOT level was high and CPK was normal. Prognosis was poor but treatment could be of use including intravenous calcium, anabolic steroids, multivitamins and 40% glucose. In the recurrent hypocalcaemic cases the animal went down, was given calcium and recovered, then there were repeated relapses and recoveries following calcium administration. In such animals anabolic steroids helped.

In excessive eating of concentrates, it could be accidental or because of the feeding system. If *ad libitum* concentrates were used then the cattle must have access to *ad lib.* high quality roughage. In the chronic form there was a low PCV, haemoglobin and albumin, and a high SGOT and CPK. In some cases there were haematomas often starting at the shoulder and then involving the whole leg and laminitis could also occur. Treatment was to restrict access to concentrates, provide long fibre (hay) and institute the use of sodium bicarbonate at a level of 12½ - 15 kg/ton concentrates. Poor conception rates were often associated with low albumen levels. There was no consistent relationship, and this was to be expected as many factors affected conception rate. However, the mean plasma albumen of 6 cows four to eight weeks after calving did provide a relationship with the conception rate in the same group.

The *laboratory diagnosis of liver disease* was discussed by **Professor Ford** (Liverpool Veterinary School). Tests for liver function could include glucose or galactose tolerance (a large volume of glucose was given i.v., then serial samples were taken and the fall plotted, as the liver removes glucose), cholesterol and esters in serum (again the liver removes cholesterol), total protein albumen and globulin (produced in tissues other than liver), flocculation tests (zinc turbidity, and iodine flocculation tests). Finally liver function could be tested by excretion of bilirubin, Ehrlich's urobilinogen test, excretion of dyes, phylloerythrin level in serum, and icteric test (however, this last one was of little use in cattle because of carotene in serum). Jaundice could be haemolytic, toxic or obstructive. These conditions could be distinguished by the use of direct or indirect bilirubin on serum, urine and faeces colour. Phylloerythrin was produced in the gut of herbivorous animals from the breakdown of chlorophyll, and a little was absorbed. If the liver was affected by some conditions it interfered with phylloerythrin excretion. This led on to photosensitisation with areas of the skin swelling in the initial stages and later sloughing. Liver biopsies were of considerable value in the diagnosis of liver problems but were little used. Another method of diagnosis was the release of enzymes into the plasma such as SGOT, SGPT (but there is little SGPT in ruminants), alkaline phosphatase, lactic dehydrogenase, arginase, gamma glutamyl transferase (GGT is specific to the bile duct epithelium in the liver) and 5 nucleotidase (5NT also in liver epithelium).

Dr. I. Reid (Institute for Research on Animal Diseases, Compton) then described *Fatty Liver and Disease* . A recent study of 200 high yielding cattle showed that fatty liver was common soon after calving. Approximately two-thirds of the cows suffered from moderate (20-40% fat content in liver) or severe (over 40% fat content) fatty liver as determined quantitatively by histological sections of needle biopsy specimens. The fatty liver was part of a generalized fat mobilisation syndrome which affected other organs including muscle and liver and it was related to the negative energy balance and loss of condition which commonly occurred in cows after calving. The consequences of the fatty liver for the cow might be serious, as in severe fatty liver there was histological evidence of changes of functional significance in liver cells and organelles, including enlargement of the liver cells with a consequent depression of the liver sinusoids, and damage to mitochondria and the endoplasmic reticulum.

The evidence of liver damage was accompanied by changes in liver metabolites including elevated levels of free fatty acids which might be of diagnostic value. Other values such as raised serum enzymes (e.g. SGOT) and lowered serum albumen concentrations reflected liver cell damage. An important clinical consequence of fatty liver damage appeared to be an adverse effect on fertility. There was at present evidence accumulating that cows with moderate or severe fatty liver had longer calving intervals (47 days longer), longer calving to first service intervals (10 days extra) and more services per conception (0.8 more) when compared with cows with mild fatty change. The consequences of fatty liver were however probably not confined to reduced fertility but they might also include increased susceptibility to postparturient infection and metabolic disease. Treatment was by lipolysis with agents such as nicotinic acid or increasing the ability of the liver to clear fat into the blood with substances such as choline and anabolic steroids. Prevention was to avoid excess weight gain in the dry period, avoid overfat cows at calving, avoid excessive weight loss after calving and encourage maximum energy intake after calving.

The second day was mainly concerned with infertility. The *Individual Repeat Breeder Cow* was discussed by **Dr. A de Kruif** (Netherlands). The normal cycle in a fertile cow was follicular growth, ripening then oestrus, insemination, transport of sperm, ovulation, development of the corpus lateum and fertilisation. There were two phases in fertilisation, the salpinx phase and intra-uterine phase, which was divided into three phases; pre-implantation, implantation and post implantation. Dr. de Kruif had made an investigation into sub-fertile dairy cows. Four hundred cows were examined one day after their fourth insemination. Their history was taken, a general health inspection made plus rectal and vaginoscopic examinations. The diagnoses made were management errors (5%), anatomical defects (19%), abnormal vaginal discharge (16%), cystic follicles (10%), delayed ovulation (2%) and clinically normal (48%).

The average age of the repeat breeders was high and pregnancy rate in the clinically normal cows at fourth examination was 60% without any treatment. There were 76 anatomical defects of which 6 were double cervical os, 4 had segmental aplasia, 7 showed adhesions following caesarean, 37 had defects of the ovarian bursa, oviduct, uterus or cervix, 19 had uro- or pneumovagina, and 63 showed abnormal discharge with cloudy mucus in 12, flecks of pus in 22, mucopurulent 10, purulent 16, dark brown 2 and one not known. Only 4 of 25 endometrial biopsies taken from cows with abnormal vaginal discharge were positive on bacteriological examination. Fourteen cows from the clinically normal group and 18 other normal cows were purchased for additional evaluation after 6 to 7 repeat inseminations. Delayed ovulation occurred only in 2 of 116 oestrous cycles observed and the two cows with delayed ovulations had normal ovulations on subsequent oestrous cycles. Of the 32 purchased cows 14 (44%) did not become pregnant. In 10 of these cows structural defects which could have prevented conception were found at slaughter.

Dr. Elaine Watson (MAFF Cattle Breeding Centre, Shinfield) described *The Anoestrous Dairy Cow*. The pressure for a 365 day calving interval had made veterinary surgeons aware of the need to examine cows not seen in oestrus by the required service period. Animals not seen in oestrus by 85 days post partum could be in one of three categories, apparent anoestrus, silent oestrus or true anoestrus. Rectal examination can be used to determine the presence of luteal tissue and the use of milk progesterone assay could monitor events. In a study of anoestrus cows 84% with a palpable corpus luteum had a milk progesterone level greater than 3 g/ml whereas 69% with no palpable corpus luteum had a basal progesterone level of less than 3 ng/ml. The reason for discrepancies could have been misidentification of corpora lutea at rectal examination, dissociation of the structure and function of corpora lutea, variation in milk composition, follicular luteinisation or extra gonadal sources of progesterone. It was not possible to extrapolate information on the functional status of the corpus luteum from its size and consistency.

The uterine tone was determined as being high or low but could not be related to the presence or absence of a corpus luteum. The best way of distinguishing cycling from non cycling cows was by determining milk progesterone levels 33 to 46 days after calving and then following 10 days later with a rectal palpation of the ovaries to detect the presence of a corpus luteum. Dr. Watson suggested that the combined milk progesterone/rectal palpation technique was suitable for incorporation into herd fertility control programmes. In a study of 85 animals using the method, 16 showed oestrous behaviour, 57 were classed as cycling and 12 (14%) were not cycling.

Reproduction in the Post-Partum Cow was discussed by **Dr. Andrew Peters** (Meat and Livestock Commision). He said that following parturition there was a period of ovarian activity before oestrous cycles recommenced. The calving interval was dependent on the re-establishment of ovarian cycles, the occurrence of oestrus (and its detection if artificial insemination was used), successful pregnancy rate to service and gestation period. In order to achieve the optimum calving interval of 365 days, a successful service was necessary at about 80 days post partum. For this to occur then the cow had to recommence normal ovarian cycles as soon as possible after calving.

It is generally assumed that suckled beef cows had a long acyclic period after calving as suckling was thought to inhibit oestrus. However, in most cases nutrition was marginal and might be of more importance. In studies within three herds the Blue Grey cow had a shorter time to cyclicity than the Hereford cross Friesian; also those calving between January and June had a longer period before cycling than those calving July to December. The potential use of two hormone preparations, namely gonadotrophin releaser hormone (LHRH) and progesterone intra vaginal device (PRID) to induce ovarian activity post partum in beef cows was assessed in about 300 cows. In the trial 250 mg LHRH was injected on day 1 and day 11. Those which received PRID had the coil removed on day 11 and a bull was put into the two groups plus an untreated control group. Oestrous detection was by chin ball markers and the time to oestrus and calving intervals was respectively 13.6 and 348.7 days for LHRH, 4.6 and 346.3 days for PRID and 11.6 and 347.6 days for controls. In another trial using cattle less than 30 days post partum the calving interval and the end of treatment to calving interval and barren percentage were respectively for LHRH 347.9 days, 311.1 days and 8.6%, for PRID 334.9 days, 299.6 days and 8.8% and for controls 348.3 days, 312.1 days and 8.9%. Thus it seemed that in the trial most control cows were cycling, the calving interval could be reduced to less than 350 days by early breeding, LHRH had no effect as cows were already cycling but the use of PRID before day 30 could reduce the average calving interval to 335 days.

Dr. A. de Druif then rounded off the infertility session by giving a second talk entitled *Herd Subfertility*. The investigation depended on history, examination of breeding records, examination of the herd, diagnosis, treatment and prevention. The normal pregnancy rate for first insemination was considered to be 60%, the inseminations per conception were 1.5 and the interval from calving to conception was 105 days. The factors influencing fertility were the bull, insemination technique, the cow, management of the herd and chance. In a select group of heifers under optimum conditions 90-100% of eggs were fertilized, 75-80% would be pregnant with 20-25% having early embryonic death. The bull gave the highest conception by natural service. If artificial insemination were used the technique and quality of service were important. The cow factors included age (conception lower with age) and infections which could be specific (e.g. Vibrio fetus, Trichomonas), brucella abortus, IBR, chlamydia and leptospirosis all occasionally lowered fertility, BVD and mycoplasma which possibly lowered fertility and other infections such as *Corynebacterium pyogenes* which lowered fertility. Conditions of herd management were particularly important including season, size of herd, the housing system, choice of bull, hygiene at the time of calving, the interval between parturition and first insemination, detection of oestrus, the time of insemination during oestrus, nutrition, selection and culling of cows.

There was a conflict of interest in the interval from calving to first insemination in that the AI Organisation considered it best to wait until 90 days, whereas the farmer wished insemination as soon as possible. As a compromise, following normal parturition a period of 50-60 days was suggested and, after abnormal calving, 75 days. Hygiene was important and calvings should be in a clean box, the hind-quarters of the cow should be disinfected, cows with retained placentas should be isolated and the calving box disinfected. Oestrous detection was often inadequate. Nutrition and fertility were also linked and it was important to select cows and also cull infertile cows. A fertility status could be worked out on the basis

$$\frac{\text{Pregnancy rate}}{\text{Number of inseminations/conception}} - (\text{Calving to conception interval} - 125) = \text{FS\%}.$$

The use of fertility status did however need to be modified according to the parity of the dam, month of insemination and times from calving to first insemination. Treatment in herds with much infertility was by means of a herd fertility control system. This involved administration (recording oestrus and abnormalities), oestrous detection, improving hygiene standards and identification of individual cows. As visits were made at regular intervals, dairymen would be stimulated to pay special attention to the various factors influencing fertility in their herds.

During the afternoon a visit was made to the Ironbridge Gorge Museum. This was followed by a talk by **R. Griffiths** (Shropshire Farm Institute) on *"The Potential at the Agricultural Colleges"*. He described the Shropshire Farm Institute which up until that time had had only male students, some on full-time courses but many more on day-release. The curriculum had a heavy practical bias and was general. Its aim was to produce good quality farm workers rather than managers. Several projects had been undertaken at the farm during recent years, including work on the Charolais breed, bull beef, calf rearing, ketosis prevention and at present the use of anthelmintics in the adult dairy cows.

The morning of the final day was devoted to calf diarrhoea and **Dr. Geoff Pearson** (Veterinary Research Laboratories, Stormont, Northern Ireland) began by discussing the *Pathology and Pathogenesis of Neonatal Diarrhoea in Calves*. He said that diarrhoea in neonatal calves was associated with a number of infectious agents including bacteria *(Escherichia coli, Salmonella spp)*, viruses *(rotavirus, corona virus)*, and protozoa *(Cryptosporidia, Eimeria spp)*. The mucosa of the small intestine had a common response to a variety of insults and all these agents produced a similar lesion. This consisted of villous stunting and fusion and in severe cases it resulted in a flat mucosa, in consequence, absorptive surface area was reduced.

Experience with experimental *E. coli* and rotavirus infections indicated that diarrhoea was more severe in enteric colibacillosis than with rotavirus. This might be related to the distribution of lesions within the intestine. Thus *E. coli* was found in association with lesions in the distal half of the small intestine, which is the site of fluid absorption. In contrast, rotavirus was associated with lesions mainly in the proximal half of the small intestine. The pathogenesis of enteric colibacillosis depended on the ability of the organisms to adhere to the villous mucosa of the distal small intestine. This could occur as early as 3 hours after oral inoculation and progressed forwards to involve the lower half of the small intestine. Pathological lesions occurred abruptly between 6 and 12 hours after challenge and by the time diarrhoea was observed lesions were extensive in the lower half of the small intestine. These findings, Dr. Pearson concluded, explained the need for prophylaxis and provided a basis for investigating field outbreaks of diarrhoea.

Dr. Ernie Logan (also from the Veterinary Research Laboratories, Stormont) followed on with a discussion of *Prophylaxis in Neonatal Diarrhoea.* He said that over a great many years the problem of calf diarrhoea had proved to be one of the most intractable. The incidence of disease and resultant mortality had remained the same despite the introduction of vaccination, antibiotics and other therapy. It was therefore important that more emphasis should be placed on prophylaxis than on curative measures. High levels of circulating antibody were necessary. As the newborn animal was dependent on maternal antibodies for its immunity to disease during the immediate postnatal period, the calf relied on colostrum as its source of antibody and until it had suckled its serum was normally devoid of gamma globulin. In the bovine animal there were three main classes of immunoglobulin, namely IgG, IgM and IgA, all of which are present in different concentrations in colostrum. Immunoglobulin levels could be measured by the zinc sulphate turbidity test, high levels meant that a calf would survive most coliform infections without treatment whereas those with low immunity status might succomb to infection.

Calves were often infected with *E. coli* at or soon after calving. They could be infected in the calving box or calf house, and the route of infection could be inhalation or via the bucket. *E. coli* and enteric viruses were very able to survive for long periods in the environment, and infected calves excreted large numbers of the organisms. Calves which had recovered from the disease were capable of excreting the organisms for long periods and there was also the existence of immune carriers. Prevention was by increasing immunity by early access to colostrum. Hyperimmune serum could protect against septicaemia and there was the possibility of vaccination. Hygiene was important as there was a tendency for build-up of infection, increased numbers of organisms and of increased pathogenicity. Therefore the calf house and calf boxes should be cleaned thoroughly. Power hose out and then use iodophor disinfectants and fumigate. All dry bedding should also be removed. As colostrum absorption decreased from birth it was best to feed the calf colostrum at birth at the rate of 1½ pints/10 kg bodyweight. This could be done with a bottle with a teat. The calf should then be allowed to stay with the dam as long as possible. Whether the calf was kept with the dam or not all the first colostrum should be fed and colostrum feeding should continue as long as possible for its local effect. In addition colostrum should be stored for emergencies.

E. coli Enterotoxin in Colibacillosis was reviewed by **Dr. Peter Newsome** (Beecham Pharmaceuticals Ltd). Calf scour was caused by a number of aetiological agents but recent studies still implicated *E. coli* as a leading source of economic loss. Enterotoxins produced by *E. coli* were of three types: heat labile toxin (LT) which resembled cholera toxin, and two heat stable toxins (STA and STB) which were smaller molecules and differed from one another and heat labile toxin in their biological properties. STA was the toxin most commonly associated with calf scour. The sequence of events leading from toxin production to death were:

E. coli in ileum → STA → Cyclic GMP/Ca++ changes →
fluid loss → dehydration → death

This sequence of events could be altered by (a) antibodies (killing the organisms but not destroying preformed toxin) (b) antitoxin antibody (acting on the *E. coli* or toxin) (c) biochemical agents (reversing biochemical changes, e.g. nicotinic acid, aspirin, chlorpromazine, nutmeg) (d) fluid replacement (rehydration therapy overcoming fluid loss). Therapy of types (a) and (d) was already available and utilized but (b) and (c) offered new approaches to treating scour.

Dr. Henri-Charles Dubourgier (Institut Nationale de la Recherche Agronomique, Beaumont, France), a microbiologist, described *Colibacillosis: Vaccination and Antibiotic Resistance.* He said it was common in France for *E. coli* in young calves to be treated with a multiple antibiotic (up to 7 agents in one bottle) injection. This resulted in a high incidence of multiple antibiotic resistance to *E. coli* in young calves. Many of the bacteria contain the K99 plasmid which allows attachment to the intestinal villi. Drug resistance tended to increase as the calving season progressed. Only a few drugs (gentamycin, colistin) were found to be active against all strains of *E. coli* on two farms. Extensive use of gentamycin was to be discouraged because resistance to that antibiotic implied resistance to all others in the aminoglycoside group.

Recently work had been undertaken in vaccinating the dam with purified K99 antigen. The original vaccine was found to protect the calves but it was toxic. It was then modified and tested on a farm where its immunogenic activity and protective efficacy were satisfactory. The vaccine as now developed involved a single subcutaneous injection 20 to 40 days before calving. This protected young calves against diarrhoea if they sucked their dam. The vaccine also showed no incompatibility with other common vaccines (e.g. clostridial and foot and mouth disease) and was now undergoing clinical investigation in France.

Further thoughts on therapy were presented by **Dr. Robin Bywater** (Beecham Pharmaceuticals Ltd) in a talk entitled *Fluid Replacement in Calf Diarrhoea.* There were two main components to diarrhoea in calves, namely *E. coli* and viruses, and the majority of deaths occurring in scouring calves were the result of dehydration. The surface area of the villi in the human small intestine is about the size of a tennis court, the small intestine of calves is twice as long and so twice the area. As the villi were stunted in diarrhoeic infections, there was less digestion. Treatment therefore depended on withholding milk and fluid replacement which had to be in adequate amounts and containing the right ionic constituents to correct deficiencies. A diarrhoeic calf showing some clinical symptoms of dehydration was likely to have lost more than 5% of its body weight. Thus a 60 kg calf would require 3 litres of fluid to correct this deficit, even without allowing for further continuing losses. In consequence the volume must be of the right magnitude and it was clear that small volumes, as were sometimes used, were unlikely to affect the progress of diarrhoea.

The loss of ions in faeces during diarrhoea were those of extracellular fluid, particularly sodium, chloride, potassium and bicarbonate. It was important to replace these, particularly the sodium. Loss of water and electrolytes in diarrhoea led to haemoconcentration and so it was not necessary to replace erythrocytes or use a plasma expander. Dr. Bywater considered relatively simple electrolyte solutions in adequate amounts were better. Parenteral fluids included isotonic saline (0.9%), dextrose saline (where energy supply was desirable), Darrow's solution (containing sodium, potassium, chloride and lactate and was useful in counteracting acidosis), Hartman's solution (containing the same as Darrow's together with calcium and magnesium). The intravenous route was effective, but subcutaneous administration was less useful due to poor circulation and the limited volumes which could be introduced. Oral fluid replacers depended on the continued active absorption of glucose and amino acids (glycine) from appropriate solutions in diarrhoea. This absorption was accompanied by movement of sodium and water thus reversing the net loss from the circulation. The result was to provide an effective and convenient method of treating dehydration. It could be used wherever calves were standing and able to take fluids orally. When animals were collapsed and severely affected intravenous therapy was required followed by oral fluid replacement. Oral rehydration was effective in many cases of scour without any further therapy. When bacterial involvement was severe, antibiotics added to the survival rate. In virus diarrhoea, withholding milk during oral rehydration would help prevent the fermentative diarrhoea caused by undigested milk reaching the large intestine.

The final session was concerned with drugs and therapy particularly in relation to the Medicines Act. **Dr. John Preston** (Merck, Sharp and Dohme Ltd.) discussed *Drugs and Clinical Trials - the Drug Company's View.* When a new drug was produced information was required about its pharmacology, drug kinetics including residue studies, animal toxicity in single and repeated doses, its effect on reproduction in terms of reduced fertility or teratogenic properties, and its intended use and sensitivity. If the drug was to be incorporated in animal feeding stuffs then the information required included the type of feedstuff, method of incorporation, compatibility/incompatibility with the feed constituents, stability in final feed, analytical methods, tolerance, safety and efficiency. Knowledge of the possible hazards to man and other wild life was required i.e. its effect on the natural biological balance such as useful insects (dung beetles, honey bees, etc), wild life (birds, fish, etc.), other livestock, the soil and man (both consumers and those using the compounds).

The total world animal health products for 1978 (which included feed additives, biologicals and pharmaceuticals) were estimated to have a value of 4775.7 million dollars of which 31.1% was used in the USA and only 3.2% in the United Kingdom. It therefore was not economic to produce a product just for the British market. Trials in Britain were today usually based on the Code of Good Laboratory Medicine. The obligations of the investigators were to provide a protocol, to observe all withdrawal times, to obtain the animal owner's consent, to provide accurate records and progress reports, and to dispose of all unused test compounds. All raw data had to be retained for a period of time. Premises could be investigated and this allowed the inspection of premises at any time, inspection of trial records and any records could be copied if it was so wished. The drug organisation was required to provide facilities, test articles, protocol for conducting the trial, records and reports. The company's research and development veterinary surgeon was also often the registration officer. He had to contact the practitioner, animal owner and stockmen. The company veterinarian also required from the practitioner the arrtibutes of recording accurately (a genuine negative result was important), discretion and commitment.

Dr. Roger Millard (Ludlow, Staffordshire) then gave the practitioner's view of *Drugs and Clinical Trials.* He stressed that in setting up a drug trial a very close relationship was required between the industry veterinary surgeon, the practitioner, the farm owner and staff, so that protocols could be agreed and the motivation of those involved discussed. Dr. Millard said that in many trials there was far too much paper work and too little motivation. It was probable that in the future there was likely to be an increase in drug trial work undertaken by veterinary practices and specialisation within practices was likely to encourage this trend. In any particular project it was always best for only one practitioner to be involved, this allowed continuity. Client/practitioner and confidentiality needed to be honored and there should be a time limit to complete the trial work. Dr. Millard thought there should be an agreement between the practice and Pharmaceutical

Company with responsibilities outlined before the start of the trial. The reporting system needed to be defined and understood, unintended deaths needed investigation, compensation should be agreed before problems arose. In conclusion the possibility of a register of interested participants was proposed.

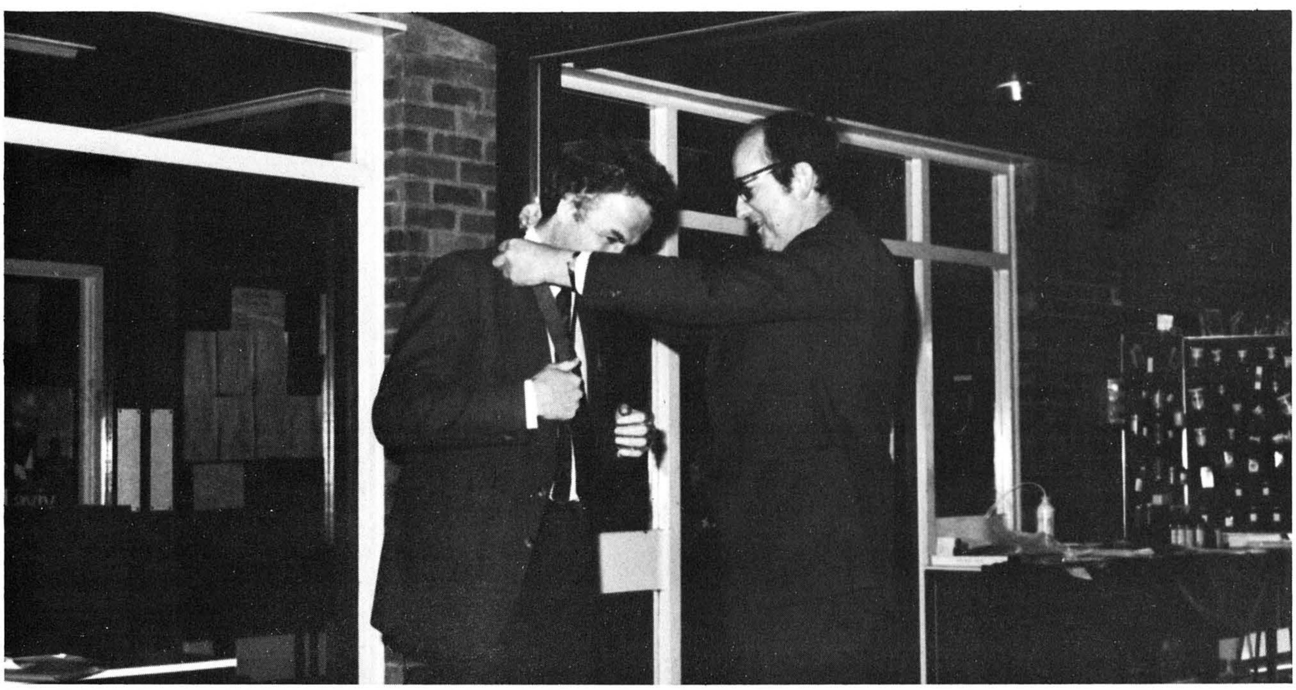
Professor George Brander (formerly of Beecham Pharmaceuticals) then discussed *Therapeutics* with particular reference to medicines legislation. There were three medicinal groups namely feed additives (growth promoters, coccidiostats, anthelmintics), pharmaceuticals and biologicals. In the world market for drugs, Europe was utilising about the same amount of the products as America. When a new drug activity was being studied it was examined for its spectrum, novelty, low toxicity and minimal residual problems. Various attributes of the drug were examined. The blood level pattern needed to be known and was dependent on absorption, persistence and the relationship to tissue distribution, and they formed the basis for further tissue studies. Areas of drug concentration were examined as they affected the dosage level and the frequency of dosage. The persistence of a drug was studied because in the veterinary field it affected the economics of the drug's usage, also it influenced residues, and was of particular importance in mastitis preparations and growth promoters. Animal models were then used in drug studies and for agricultural products, these were usually the calf, pig and chicken. In addition new experimental animal models might be used such as the mouse mastitis model. The pharmokinetics of the drug were important and had relevance for experimental animal studies, disease related studies and the development of dosage regimes. Once these attributes of a drug were known then different formulations might be tested such as its addition to feed or water, its stability, the variety of types of formulation, its standardisation and the types of animal to be treated as different formulations might be required.

Each session of the conference was followed by a lively discussion and it was a credit to the organizers that almost as many delegates were present at the end of the meeting as at the beginning.

B.C.V.A. Officers

At the Annual General Meeting of the British Cattle Veterinary Association held on Thursday, 9th April at the Shropshire Farm Institute, Baschurch, Shrewsbury, Shropshire, the following officers were elected:

President:	A. H. Andrews, BVetMed PhD MRCVS
Senior Vice-President:	W. J. Harrison, BVSe, MRCVS
Junior Vice-President:	D. A. K. Thornton, BVetMed, FRCVS
Honorary Treasurer:	I. D. Baker, BVSc, MRCVS
Honorary Secretary:	C. Davis, BVM&S, MRCVS
Programme Secretary/ Public Relations Officer:	A. D. Weaver, BSc, DrMedVet, PhD, FRCVS.



W. Harrison, BCVA President (right), handing over the chain of office to A. Andrews.