

Camelids Chronicle

NEWS-SHEET OF BRITISH CAMELIDS LTD., OWNERS AND BREEDERS ASSOCIATION

Committee Elections

As promised at the founding meeting of British Camelids, the Steering Committee will stand down at the end of the first year to be replaced by an elected committee which will serve for 3 years. The new committee will take over at the A.G.M. on 2nd December 1988.

The association is in a healthy condition with a bright future in a climate of widening enthusiasm for, and rapidly developing knowledge of, Camelids. The retiring Steering Committee can vouch for the fact that serving the discerning membership is both challenging and enjoyable.

Please will members now put forward names of people who are willing to take on one or other of the following responsibilities—

Chairman, Treasurer, Secretary, Registration, Publicity and Shows—
and can those names be with the secretary as soon as possible, certainly **no later than November 1st 1988** so that a postal vote can take place before the A.G.M.

U.S.A. Connection

We have been approached by the International Llama Association with the suggestion that British Camelids might like to form some degree of affiliation with them. It is the opinion of the Steering Committee that this would be beneficial to us and further dialogue is taking place. We would welcome comments from the Membership.

Showtime

Many members have taken their animals and fibre products to local shows and report how they attracted great interest and admiration. It is also noted that a lady spinning seems to be an irresistible lure...

The Royal Show

Now that our Chairman has laid down his brush and dust pan - after keeping the Camelids spotlessly clean in their pens at the Royal Show, I feel the British Camelids can sit back and be quite pleased with their first adventure into the show world.

I arrived at the site on the Thursday before the show having left home at 5am with gates, padlocks, buckets etc., to find no pens and with the rain pouring down. It didn't put yours truly in a very happy frame of mind. However, with telephone calls and proddings in the right direction, all was finished as the first llamas arrived Friday tea-time.

Showing fibre, raw, dehaired and spun; processed to make pullovers, scarfs, waistcoats and a beautiful shawl by knitting and weaving was a great source of interest, especially having the alpaca, llamas and guanacos to show off the fibre on their backs.

A valiant job was done by our chairman's lady wife, Ann, who was at

her spinning wheel throughout the show being asked questions. Mrs Jackson who came down from Cumbria and Mrs Moss, all helped spin the show away - whilst Mrs Dawes brought her loom and wove some guanaco and silk. Thank you ladies! You did a great job helping to put fibre on the map.

Every night our treasurer could be seen in the corner with her money box counting her 50p's from sales of the Camelid Chronicles; it is believed she slept with it under her pillow.

Our site was in a good position, but we did have to explain that the rather healthy smell which drifted over us was not the llamas, but the pig unit.

Although not many members visited us, we did come across a number of people with llamas and alpacas whom we did not know about, and several decided to become members.

We must thank the RASE for giving us our site F.O.C., plus penning for which we are most grateful - the only cost to the society for the show was the banner. It was quite an expense for some members as they had to have their

animals vetted for the show - pay transport - and accommodation for the week, which was not cheap in the area. Flowers, display, and food all came out of members' pockets - which I feel should be born in mind when suggesting we should be seen at more shows around the country. However, after saying all this I really feel we made our mark as **British Camelids**

Pamela Walker - Show Co-ordinator

The Highland Show

I phoned Dr. Angus Russell of The Macaulay Land Research Institute and offered some animals for their Stand at the Highland Show and this was gratefully accepted.

We collected Pat Bentley's lovely red Alpaca, Matchu Pichu, from Cumbria, and took him along with Chimu, a tall white female llama of ours and her 4 week old calf, Quito.

We had never been to a show like this before, so we did not know what we had let ourselves in for! Although it was exhausting and a hectic 4 days, we thoroughly enjoyed ourselves.

It was nice meeting the people from The Macaulay and The Rowett, and to be able now to put faces to names. Some of the Land Research people hadn't a clue what Camelids were when they arrived to help on the Stand, but by the time they left, they had become quite expert.

The first day was Family Day and we had all the usual questions - *Do they spit? Can we stroke them? Can you eat them?* The next 3 days we had more serious and at times very interesting talks with people who were genuinely interested. A lot of questions were asked about the fibre and we made some useful contacts. Pat joined us on the fourth day returning from a business trip abroad with her husband. We left tired but enlightened about 7pm Wednesday evening with our very bored animals, who were very glad to get home and stretch their legs. Our general impression of the Show was the lovely ice cream, the Hill Farmers looking at and prodding our animals incredulously, and the friends we made.

Peter Knowles-Brown - Chairman

Association News

Notice

Presentation on Co-operative's Wednesday, 19th October 1.30 pm. Crossroads Hotel, Weedon, Northamptonshire. Everyone welcome.

Visit to Midway Manor 22nd August 1988

Llamas add dignity to any vista and at Midway Manor in Wiltshire, they look splendid. We are very grateful to **Rosemary Walker** and **Derek Williams** for hosting what proved to be a thoroughly enjoyable day.

When the Association gets together not a moment is wasted, everybody present took full advantage of the opportunity to communicate and conversation never stopped. Debate became quite brisk at times. All constructive, all valuable.

Is it the usual tranquility of Midway I wonder, that enables groups of male Llamas to live in close proximity to females without fighting? Are they the exception to the rule? Or is the rule wrong?

As a new member/owner commented in the general discussion which followed the brief business meeting, we don't seem to know - absolutely surely - very much: justifiable comment! If the South Americans after hundreds of years of camelid husbandry cannot tell us, absolutely, we will have to learn the long hard way. Gatherings such as this will help us work through the theories to truth.

Derek and Joy took groups of us on tours of the animals and were wonderfully free with their knowledge. Large groups of Llamas and Guanacos with their young were a joy to see. There are two small groups of alpacas with young, the senior female alpaca is known to be 20 years old and is in calf again. She has been blind for many years but only high winds upset her, the turbulence distorts the sounds and scents on which she relies; on such days help is always available.

We were shown the recently approved on-farm isolation quarters in which a group of Llamas, imported by a member, are nearing the end of

their regime, soon to be released to their new owners.

Eve Beadle brought a large selection of her hand spun, hand knitted garments and demonstrated that a viable small business can be developed by taking the fibre from farm to fabric.

As a bonus the sun shone and we also saw wallabies, emu and a grevie zebra, making it a truly memorable day.

Thank you Rosemary and Derek.

Further Association Gatherings

Judy and Paul Rose have kindly offered to host a meeting at their home in Gloucestershire in the Spring as they shall be away for most of October, the month we would like to have another pre-AGM meeting. It would be nice to make such gatherings a regular event, so is there anyone out there who would like to host a meeting towards the end of October?

Association Logo

There were 11 jolly good suggestions for a logo and we are grateful to all who devoted time and talent to giving the first round selectors plenty to ponder over.

It can't have been easy to whittle down the entries to the selection of three which were presented to the members for the final vote. The sketch which was favoured by most voters is all we need - simple, distinctive and memorable.

Our thanks to Mr Brian Gough for his design, and to Michael Warner and his firm who made the selection, organised the vote and produced the final sample.

Pat Bentley

The History of Alpaca Fibre

Alpaca fibre was spun into fabric by the Peruvian Indians for many centuries before its introduction into France and Germany through Spanish importation. It was first spun in England in 1808 but was considered unworkable! In 1830 Benjamin Outram of Halifax also

attempted to spin the yarn and came to the same damning conclusion. But in 1836 Sir Titus Salt, a Bradford manufacturer, was finally able to develop alpaca fabric through the revolutionary introduction into the trade of cotton warps. The cloth, known as *Orleans* was woven from cotton warp and alpaca weft and developed into an enormous industry that enabled Sir Titus Salt to become one of the richest manufacturers in Bradford. Both yarn and cloth were exported to the continent, U.S.A. and South America in large quantities. Initially it was used as a dress fabric but was later used mainly for linings.

Crossing Alpaca with Sheep

The huge success of the industry created a great demand for alpaca fibre which could not be met by imports from the native homelands, and so alpacas were introduced to England, Europe and Australia. For some reason the animals failed to thrive and attempts were then made to cross breeds of English sheep with the alpacas. But this also proved unsuccessful and further endeavours in alpaca farming were abandoned. It would be interesting to learn more about the 19th century methods of alpaca husbandry that led to the dismal failure of this venture.

Mandi Hook

LL for LLama

Llamas are now far more common than one might at first envisage. Some members of the Camelids Association, who are enthusiastic llama owners, had heard there were several of the animals to be seen at a Tibetan temple in the Borders. On visiting the monastery and stating their interest by enquiring about the llamas they were told: *Yes, we do have Llamas here, but I think you have been somewhat misled!* Perhaps they ought to have born in mind Ogden Nash's delightful verse:-

*A one L Lama he's a priest,
A two L LLama is a beast,
And I bet a silk pyjama
There is't any three L LLLama!*

Ed: *Further good reason of which we hadn't thought, when we decided not to form the Lama Association.*

Llama Breeding

Last winter saw the arrival in Aberdeen of 13 female llamas of mixed ages. Six were obviously prepubertal (1987 born) and of the older ones (1 and a half - 4 years) six were diagnosed as pregnant (a) by ultrasound scanning and (b) from blood progesterone levels. It was impossible to determine the age of the foetus from the scanning image without having had previous experience with camelids and so accurate birth dates could not be predicted. The presence or absence of pregnancy, however, was indeed clear and the results were confirmed by blood plasma progesterone values which were invariably high in pregnant females (above 6 ng/ml) and low in non-pregnant animals (below 1.5 ng/ml). Progesterone is a hormone secreted into the blood stream by the *corpus luteum* which is the structure that forms in the ovary following ovulation and remains throughout pregnancy. In the absence of pregnancy or ovulation, i.e. in the absence of a corpus luteum, blood progesterone levels will therefore be basal.



Dr Clare Adam and friend

Two of our 6 pregnant llamas lost their calves (one early abortion and one still birth) but the four others duly gave birth with ease to healthy offspring on dates ranging from 5th April to 26th May. The first calf was male and the other three were female. Beginner's luck! The calves seemed to suck their dams very frequently for short periods, and they doubled their birth weights of 11-13kg within the first month of life. As each llama calved, she was removed from the main group into an individual pen until we were happy that the calf was doing well. Upon introducing dams and calves to the herd, we were alarmed to notice that some of the yearling females started to suck the new mums too (and the latter did not appear to mind)! However, the calves continued to gain weight satisfactorily at over 300g/day.

Inducing ovulation

By May our yearling females were well grown, at 90-120kg, and were judged to be ready for breeding. However, before allowing mating in these and the older non-pregnant and lactating animals, we carried out a preliminary trial to see if we could induce and synchronise ovulation in llamas.

Female camelids do not have regular oestrous cycles like sheep, cattle or horses. Rather, they are almost continually in oestrus or receptive to the male (if not prepubertal or pregnant) and the act of mating induces ovulation, as in the cat or the rabbit. Mating causes a sudden release of gonadotrophic hormone from the female's pituitary gland into the blood stream. This then acts on the ovary causing a follicle to rupture, releasing an ovum, i.e. ovulation. Ovulation can therefore also be induced by simple injection of gonadotrophin, and this has been demonstrated in Peruvian alpacas.

We gave each of 10 female llamas a single intramuscular injection of either 500 or 750 international units of human chorionic gonadotrophin (HCG) (Chorulon; Intervet Laboratories Ltd., Cambridge) and measured progesterone levels in blood samples taken at the start and three times weekly thereafter in order to detect the presence or absence of corpus luteum (CL), i.e. whether ovulation had been induced, and to follow the life-span of the CL in the absence of mating and conception. Plasma progesterone values were low initially (less than 1.2ng/ml) in 9/10 llamas, started to increase after 2 days, reaching peak values of 4.6-10.3 ng/ml after 6-9 days, and declining back to basal values (less than 1.6 ng/ml) after 10-13 days.

Ovulation had therefore been induced in 9/10 llamas, the CL reaching peak progesterone secretion after 6-9 days and regressing by about 13 days. The tenth llama, a yearling, had high progesterone on the day of HCG injection indicating that she had already had a spontaneous ovulation and therefore could not respond as expected to the exogenous gonadotrophin. If fertilization does not occur the CL regresses, new follicles in the ovary develop and are primed ready to ovulate given the appropriate mating or gonadotrophin stimulus. Thus following a sterile mating one can expect a delay of at least 13 days before a llama can mate satisfactorily again.

Natural mating

The next stage in our programme was to allow (and encourage!) natural matings in our llama herd in order to increase numbers for future experimental work. We decided to use the *alternate male* technique i.e. putting male A into the herd for a week, then Male B for a week, then male A again etc. The theory is, of course, that as the females are all receptive at the same time, the male can rapidly become exhausted when introduced to the herd of females and some females may not be mated. A week to recover away from the ladies and provision of an alternative stud to keep the females interested are supposed to do the trick! At the end of each week, blood samples were taken from the females to detect the occurrence of ovulation from progesterone concentrations. Initially, as we only had male A, he went into the herd for 1 week, away for 1 week, in for the following week, and then replaced by male B, each male then having alternate weeks. From observations of matings and from raised plasma progesterone values it appears at this stage that pregnancy has indeed been initiated in all of our female llamas.

One important lesson learnt during this period was not to take chances with a stud male llama with his harem! As indeed is the case with stags and even bulls, the tamest pet becomes a dangerous wild animal acting on instinct and with no fear of humans. To our alarm this aggression was also directed towards the single male calf which was suckling. He must have been seen as a threat as the female calves remained unscathed. The only way to allow his mother to mate was actually to wean him, and as he was already over 40kg and over 100 days old he adapted well (with two alpacas to keep him company in his pen).

So far, so good! We shall of course be monitoring the progress of gestation in our llamas, by ultrasound scanning and by blood hormone profiles, and I hope to be able to report a successful season next summer.

Dr. Clare L. Adam, Rowett Research Institute.

Vaccination of S. A Camelids

By Peter Scott

MSc; BVSC, MRCVS, Mi Biol



To begin, it is important to distinguish between passive and active protection. Passive protection is provided by the dam, through the placenta or via colostrum, or it can be increased by giving parenteral antisera. Active immunity is that which develops in response to a disease organism, either during the disease or due to vaccination using killed or modified organisms. There are a number of combined products called sero-vaccines aimed at giving passive protection through antiserum, and stimulating active immunity to take over through a vaccine component.

Colostrum generally contains antibodies only against those diseases recently encountered or vaccinated against, and the protection it gives is short lived, only until the young animals immune system fully switches on.

Diseases

South America Camelids (SAC's) suffer from a number of diseases against which other farm species can be vaccinated, the major potential threats include:

enterotoxaemia, *Clostridium perfringens (welchii) types C&D*; **malignant oedema**, *Clostridium septicum*; **tetanus**, *Clostridium tetani*; **neonatal diarrhoea**, *E.coli*, *Salmonella*.

In Peru it is reported that some flocks lose up to 50% of the

young stock from enterotoxaemia caused by *Clostridium perfringens*. **Clostridial Sheep diseases for comparison**

Black disease, *Cl. novyi*, Adults: **Blackleg**, *Cl. chauvoei*, adults and lambs: **Braxy**, *Cl. septicum*, yearlings: **Lamb dysentery**, *Cl. perfringens type B*, lambs -3wk: **Struck**, *Cl. perfringens type C*, adults: **Pulpy kidney**, *Cl. perfringens type D*, growing lambs: **Tetanus**, *Cl. tetani*, all ages.

Vaccinations

Clostridial vaccines are probably the bare minimum for vaccination, four companies manufacture them; Coopers, Hoechst, Ciba-Geigy and C-Vet. Individual choice will often depend on perceived need, risk assessment and hopefully veterinary advice. Generally stock is vaccinated and boosters timed in breeding stock for a couple of weeks prior to the birth, this ensures maximal levels of antibodies in the colostrum and gives protection in lambs for up to 12-16 weeks. Fowler recommends Clostridial vaccination of the dam 2 months before birth, then repeated three weeks later, this he reports protects the young for its first three weeks.

The question of when to vaccinate neonates for the first time is vexed, if given early there is in theory a chance for the maternal antibodies absorbed by the young animal to mop up the vaccine leaving no antibodies and nothing to stimulate protection. Some USA llama herds however use this as a routine, they claim evidence that the newborn are immunocompetent i.e. that they can mount a response to the vaccine immediately which is not negated by maternal antibodies. For the time being however the safer more reasonable course starting at 2 months may be more appropriate.

Orf vaccines in the UK based on a mild live orf virus are available for sheep but although SACs can suffer from orf, I know of no-one who has used the vaccine. The risks may well be unacceptably high since a vaccine developed to be slow in one species need not be slow in another. Using live vaccines in unusual species can carry high risks of actually causing the disease. In the USA killed vaccines are used but with mixed results since the virus seems to show regional variations.



PRODUCTS FOR CAMELIDS

Specialist Products for special animals

We are pleased to support British Camelids by making various items selected to be suitable for camelids available directly to them

BSP Soluble multivits - for the prevention of vitamin deficiencies in llamas and alpacas, particularly valuable for young animals, it contains vitamins A, B2, B6, B12, C, D3, E, K, nicotinic acid and d-pantothenate. One 227g sachet in 80 gallons of drinking water

Capriboost - a high potency powder multivitamin supplement for top dressing food. High potency means that you use a minimal amount (which is important for picky animals), 1 teaspoon per day per llama! Storage tends to decrease the vitamin content of forage (particularly vitamins A & E), Capriboost is formulated to compensate for such deficiencies by supplying a wide range of essential vitamins, minerals, and trace elements. It contains biotin and zinc which are particularly important to the fibre producer.

EquiBio - a biotin supplement for hoofed animals from horses to llamas (and we even stretch a point to elephants). Biotin deficiency has been implicated in skin problems and cracked feet in a wide range of species, signs include thinning of hair and dermatitis. SAC's would require approximately 5-10mg/day.

Aminolyte - a prime factor in treating any animal with scours is maintaining hydration and supplying the electrolyte salts lost in the scour, it is also important to provide some easily absorbed basic nutrients. The product is purely intended as an adjunct to veterinary treatment.

Ark-Cide - a low toxicity but highly effective germicide with a wide spectrum of activity against both gram-positive and gram-negative bacteria and many viruses, can be applied by spray, fogging machine or old fashioned (but effective) bucket. Ark-Cide is a combination of formaldehyde, glutaraldehyde, quaternary ammonium compounds and non-ionic detergent in a pleasant lemon smelling solution. 5litres of 1% Ark-Cide will cover 100 square metres of walls and floors.

Tamodine - an antibacterial/antifungal shampoo, ideal for routine shampooing or cleansing areas of fly strike or where there has been any seborrhoeic dermatitis and eczemas complicated by fungal or bacterial infections.

Detailed formulations of the above are available on request. A number of other products are currently available for specialist livestock and we will be pleased to quote for your specific needs.

Specialty Imported and highly recommended: "Animal Breeding and Production of American Camelids" by Rigoberto Calle Escobar, described as the only book of its kind in English covering the scientific and technical guidelines for improvement of camelids. It was written as a guide for the commercial alpaca breeders of Peru. cost inc P&P £23.50

Order Form

Name: _____
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Please supply the following:

| | | each | Number | Amount |
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| BSP Soluble multivits | 227g sachet | £2.72 | | |
| Capriboost | 1kg sachet | £9.30 | | |
| | 5kg bucket | £46.50 | | |
| EquiBio | 300g sachet | £14.82 | | |
| Aminolyte | 85g sachet | £1.48 | | |
| Ark-Cide | 5L | £19.25 | | |
| Tamodine | 100ml | £3.10 | | |
| "Animal Breeding" | book | £23.50 | | |

Prices include Postage & Packing

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Post to: Vetark Animal Health, PO Box 60,
Winchester, SO23 7LS
Telephone 0962-880376

Various vaccines for Pasteurellosis exist (Carovax, Heptavac P, Pastacidin, Topclip P), some covering both *P. haemolytica* and *P. multocida* (septica). Generally these don't seem to be used although they may have a place eventually in animals being shipped long distances or in flocks where this is considered to be a problem.

A killed Ovine Enzootic Abortion Vaccine is available based on the Chlamydia which causes the disease. This doesn't seem to have been used and it seems uncertain whether or not SAC's can suffer from the disease.

In herds where neonatal scour and losses have been associated with Salmonella or *E.coli* a vaccine (Bovivac) is available, this can be given to dams and boosted three weeks before the expected birth.

Passive Immunity

On the passive immunity side there are serum products of horse or cattle origin which provide passive immunity to the young animal.

Bovisan DPS (horse origin) *E.coli*, *S.dublin*, *S.typhimurium*, *P.multocida*; **Ecosan (cattle origin)**, *E.coli*, *S.dublin*, *S.typhimurium*, *S.enteritidis*; **Haemosan**, *P.multocida*, *P.haemolytica*; **Lamb Dysentery**, *Antiserum Cl.perfringens type B,C&D*; **Lambisan**, *Cl.perfringens type B&D*; **Pulpy kidney**, *Antiserum Cl.Perfringens type D*

Ecosan plus Lamb Dysentery Antiserum would seem to give the widest theoretical spectrum of protection, although Fowler reports that Clostridial toxoids are not effective. When the need exists it may be felt better to do something with a low chance of success than to do nothing at all.

Colostrum has a twofold function, as a high energy source to give the young animal the strength to get started and as a source of maternal protective antibodies. Lambs need 180-210ml colostrum/kg during the first 18 hours to give sufficient energy for heat production, the lower level reflects the needs of housed animals. This level would normally contain sufficient immunoglobulins for adequate protection. The nutritional status

of the dam greatly influences the level of colostrum produced.

Handrearing

If handrearing SAC's there are decisions to make, if no SAC colostrum is available which alternative is best, cow, goat, ewe, or mare? Opinions seem to differ but what must be considered is what maternal antibodies are likely to be present, the energy can be supplied by artificial sources but it may be best to look for a ruminant species which has been recently vaccinated against Clostridia or Salmonella and *E.coli*, than a mare which has probably only received a tetanus vaccination. Generally no more than 50ml/kg is given per feed, so a minimum of 3-4 feeds are needed in the first 18 hours. It may be in these animals that early vaccination and antiserum products have a place.

Leptospirosis vaccination seems very common in the USA although this is not a feature of British farming, even with SAC's, if it is known to be a problem then vaccination may be considered but finding a suitable vaccine with the appropriate bacterins may be impossible.

Other techniques for boosting protection in the newborn include the taking of blood from the dam and giving the separated plasma orally within the first 24 hours as a colostrum substitute, or by intraperitoneal injection (plasma crossmatching is probably worthwhile before doing this).

It must be said from the beginning that none of these products are licensed in the UK for use in SACs, nor are they ever likely to be; the owner is alone. The costs of licensing drugs are such that fringe areas suffer badly. Nevertheless, some of these vaccines are used routinely, others as "one-offs". Even goats suffer from having few licensed products, they commonly have injection site reactions at the sites of injection of multivalent Clostridial vaccines, and their protection levels are said to be lower than in sheep.

If you have experience of problems with vaccines please write in and let us know.

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Notes on the Nutrition of Camelids

Colin Campbell M.A., M.S.C., Director of Sheep Programmes
U.S. Feed Grains Council in England writes:

In preparing these notes of the feeding of Camelids I am in no way pretending to be an expert on the nutrition of these species. My information is limited to:

- my work on the feeding of sheep, goats and cattle in many countries,
- very limited literature which I have been able to collect,
- six months observations on our own guanacos,
- conclusions drawn from the above.

I am quite prepared to accept that some of my points may contain errors and I should be grateful if readers would contact me and indicate my mistakes. The aim of these notes is merely to provide some practical guidelines for Camelid owners so that they may be able to feed their animals more economically while at the same time improving fibre yield, health, growth rate and reproductive performance.

The basic information which is needed to formulate a feeding regime for Camelids is first their requirements for energy and secondly, protein. To date I have been unable to find this basic information, but it is likely to be available shortly from the work now taking place at various Research Institutes. Taking sheep data it is fair to assume that to maintain weight of a 100 kg Camelid around 12-13 MJ of metabolisable energy (ME) per day is required together with 130g of crude protein. Likewise, if the same animal is to gain weight, the allowance would have to be raised to 15 MJ of ME and 25 MJ during early lactation. Rations can thus be readily calculated using feed ingredient composition tables and for quick reckoning cereals contain around 13 MJ of ME per kg dry matter while hays and silages will vary between 7 and 11 MJ of ME depending on quality.

In order to feed Camelids correctly, their production cycles must be the first consideration and this can be conveniently divided into twelve months, i.e. eleven months gestation, approximately four months lactation with mating taking place during the first month after calving.

Table One - Camelid Foetal Growth Rate

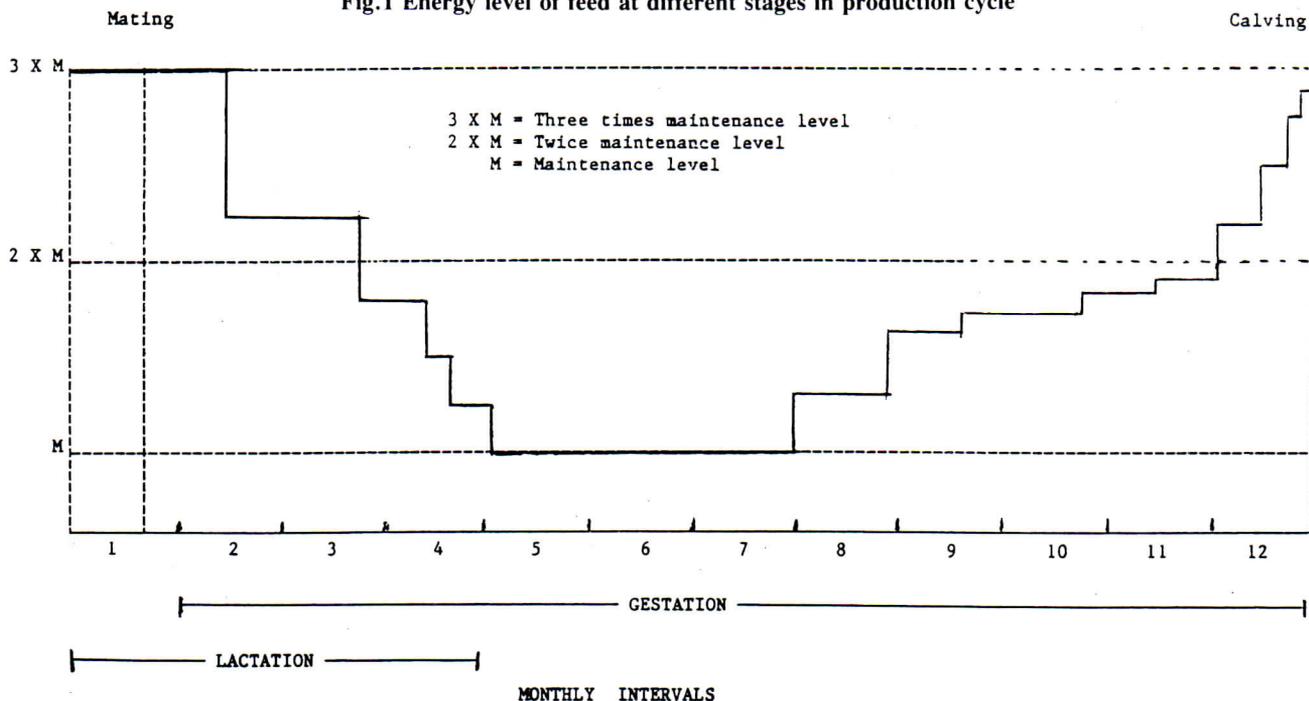
| Months of gestation/ Foetal Weight (g) | | | | | | | | | | |
|--|-----|-----|-----|-----|-----|-------|-------|-------|-------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 100 | 150 | 200 | 300 | 450 | 600 | 1,500 | 2,600 | 4,800 | 6,750 | 9,000 |

From reference to Table One it can be seen that the Camelid foetus grows very slowly during its first six months (only 5% of its final weight at birth) while during the final five months of pregnancy growth is very rapid. Thus the energy requirements for foetal growth are minimal during the first half of pregnancy, but substantial during the final five months. However, although during the first four months of pregnancy the foetus is requiring little nutrition from the dam, this is a time when milk production is at a maximum and thus in order to sustain a good growth rate in the calf, feeding at a high level must be maintained. An adequate level of nutrition is also necessary during the month after mating in order to ensure that the embryo implants and grows and is not reabsorbed.

Figure One has been prepared to illustrate the nutritional requirements month by month throughout the year. Maintenance is defined as the quantity of feed (energy) that is required to maintain an adult non-pregnant animal at a constant weight. Thus at calving the Camelid should be receiving about three times her maintenance requirement in order to have produced a healthy 9kg calf, to have adequate body reserves so that she can yield plenty of milk for her calf and finally to ensure that her new embryo will survive and implant after she is mated during the first months after calving. This level of feeding is then maintained for at least the first six weeks of lactation after which, it is steadily decreased until she weans her calf at between three and four months of age. The time of lowest energy requirement and the time when savings in feed costs can be made are the fifth, sixth and seventh months of gestation when the foetus is still small and the calf has been weaned. During the final five months of gestation the foetus is growing rapidly and the mother should be gaining in body condition so that she has ample body reserves for lactation and a fresh pregnancy.

Very little information again seems to be available on the protein requirements of Camelids, but some South American authorities seem to consider these to be less than those of sheep and cattle. It is fair to assume that requirements will vary between 12% and 16% crude protein in the total diet. The higher level being necessary during late pregnancy and early

Fig.1 Energy level of feed at different stages in production cycle



lactation with the lowest levels being adequate during mid-pregnancy.

Even less data can be found concerning vitamin and mineral requirements and the main reports concern deficiency diseases which have been observed in areas where certain minerals are deficient or in excess. Camelids appear to be tolerant of copper and at the same time are assumed to need this mineral. Muscular dystrophy in young Camelids has been reported and this problem can be prevented by ensuring that vitamin E and selenium are present in the diet and calves can be injected with vitamin E and selenium at similar dose levels to sheep if this condition continues to present problems.

Practical Feeding Recommendations

Since the Camelid is a ruminant it requires a major portion of its diet to come from forage on which it can ruminate. Usually farmed Camelids graze on pasture during the summer and then receive hay in the winter. Observations would indicate that Camelids prefer to graze short pasture and if it becomes long and coarse it should be topped. In South America Camelids can be either grazers or browsers, in the puna of Peru and Bolivia they graze short grasses while the guanacos in the south of the Argentine and Chile browse on small shrubs. No doubt Camelids will eat both grass and arable silage, but there are very few reports on feeding this type of roughage. The usual feeding practice with farmed Camelids in the U.K. is to offer hay to appetite during winter and grazing during spring, summer and autumn. Concentrates are used to make up the animals' nutritional requirements, not met by its roughage intake, at any time of the year depending upon the stage of the reproductive cycle as already discussed.

Since most Camelid breeders in the U.K. wish to produce as many calves from their females as possible, feeding is normally on a high plane so that calves reach breeding age as soon as possible and the adults produce a calf every year. Thus, with these high value animals the cost of feeding is not a major limiting factor. Concentrates which are usually considered high priced have to be fed if this level of performance is to be achieved.

Concentrates can either be bought as straight ingredients and mixed at home or purchased as a complete mixture from a feed company. The main straight ingredients are the cereals wheat, barley, maize and oats; the by product feeds such as dry beet pulp and maize gluten feed and the protein feeds such as fish meal, soybean meal, linseed flakes, peas and beans. For optimum digestion concentrates should be fed in as coarse a form as possible as in my experience fine meals are both unpalatable and are not as well digested. Concentrate pellets and nuts are merely pelleted meals and return to their meal form in the stomach. Their only advantage is as a means of feeding unpalatable meals and ensuring the consumption of finely ground or unpalatable ingredients by combining them with other feeds in acceptable pelleted form.

Ideally cereals should be fed in rolled form to Camelids, if ground they are unpalatable and if fed in whole form (ideal for sheep and goats) a proportion will pass through undigested. Rolled barley is the cereal of preference, oats tend to be too fibrous and low in energy, maize at present rather expensive and wheat tends to be glutinous and not generally available in rolled form. With respect to proteins, pelleted 66% fish meal is the best nutritionally, but it is both expensive and can be unpalatable. Soybean meal tends to be unpalatable in its meal form, but it is excellent if available in pelleted form. Rolled peas and beans are a good source of protein, but tend to be expensive per unit of protein. The most palatable, economic and easy to be fed protein is linseed flakes which are now generally available.

The most readily available by product concentrate is dried molassed sugar beet pulp. This feed is palatable, contains excellent digestible fibre and mixes well with rolled cereals. Dry pulp should be restricted to 25% of the concentrate mixture as it swells when coming into contact with moisture in the stomach.

The practice of feeding minerals and vitamins is a subject on which there are several views. In simple terms one can either add minerals and vitamins to the concentrate mixture, have them pelleted with concentrates, or one can offer them free choice in a hopper and let the animals help themselves. None of these methods is ideal especially since the vitamin/mineral requirements of Camelids have received little study. Adding supplements to a loose mix may lead to them being left in the feeder, pelleting them with concentrates may result in excess feeding and offering free choice may result in under consumption. Present knowledge would seem to favour the use of a general purpose cattle supplement containing the major minerals and trace elements and including selenium, copper and vitamins A, D and E.

A practical feeding system which seems to work in practice is as follows:-

- a) Hay and/or grazing ad lib depending on the time of year.
- b) On average one kilogram of a concentrate mixture per head per day. This quantity can be varied between 750g and 1,500g depending on the stage in the reproductive cycle as already described.

A great variety of concentrate mixtures can be formulated which will give good results and be palatable to Camelids. Around 14% DCP in the concentrate mixture should be adequate and allow for low levels and/or digestibility of protein in some forages. Fine and dusty meals tend to be unpalatable and should be avoided. Choice of concentrate mixture formulation will depend on three factors:-

- a) local availability
- b) price
- c) individual preference

The following are four suitable mixtures, which can easily be varied by the Camelid owner, provided the basic nutritional considerations of energy and protein levels are used in the formulation of concentrate.

Parts by Weight

| | A | B | C | D |
|-------------------------------|------|------|------|------|
| Rolled Barley 10% DCP | 4.0 | 3.5 | 6.0 | 6.5 |
| Coarse horse mixture - | | | | |
| Br. Horse Soc. 11%DCP | 0.0 | 3.0 | 0.0 | 0.0 |
| Coarse Dairy Mixture 16%DCP | 3.5 | 0.0 | 0.0 | 0.0 |
| Linseed Flakes 30% DCP | 1.0 | 2.0 | 2.0 | 0.0 |
| Dairy Protein | | | | |
| concentrate pellets 40%DCP | 0.0 | 0.0 | 0.0 | 1.5 |
| Dry molassed beet pulp 8% DCP | 1.5 | 1.5 | 2.0 | 2.0 |
| | 10.0 | 10.0 | 10.0 | 10.0 |

If the system of offering free choice minerals and vitamins ad libitum in a dry container is used Coopers No. 1 General Purpose *Be Sure* cattle mineral and vitamin mixture is suitable and available from most feed merchants.

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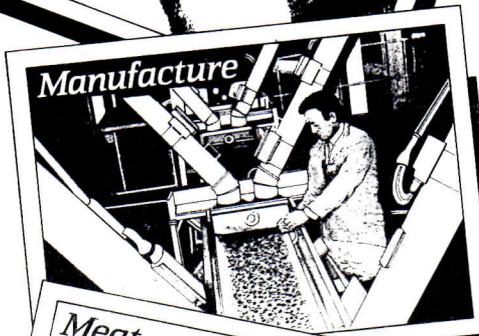
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