Care of the dairy goat

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Western Australian Department of Agriculture

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CARE OF THE DAIRY GOAT
CARE OF THE DAIRY GOAT

by R. Bettenay, Senior Adviser, Dairy Cattle Husbandry, Dairy Division.

DAIRY goats are never likely to challenge dairy cows as suppliers of milk to the Australian population, but nevertheless many are kept and milked near Perth and other centres. The milk is purchased mainly for people allergic to cow's milk. Many people also keep one or two goats to supply milk for their own use.

Contrary to a popular belief, the more productive domestic goat is a fussy eater which requires careful treatment and a balanced ration. She cannot be expected to produce well under adverse conditions.

This bulletin is designed as an introduction to dairy goat keeping. More information can be obtained from officers of the Dairy Division, Department of Agriculture, and from the Goat Breeders Society of Australia.

REGULATORY
Shire councils have power to define the conditions under which goats may be kept and intending goat keepers, particularly in built up areas, should consult local health surveyors before acquiring goats. Dairy does are clean and odourless animals but they might be held to constitute a nuisance under suburban conditions.

It is expected that regulations being framed under the Dairy Industry Act, 1973 will set minimum standards under which goats may be housed and milked for milk to be offered for sale. Anyone intending to keep goats commercially would thus be well advised to consult the Dairy Division, Department of Agriculture, before erecting premises.

The minimum standard for milking sheds will include a concrete floor, impervious walls to the milking shed and milk storage room, the provision of hot and cold running water and adequate drainage. The minimum distance between the milking shed and housing premises is expected to be 20 metres and standards will be set for the adequate cooling of milk to be offered for sale.

QUALITY OF GOAT'S MILK
The composition table shows no significant chemical differences between goat's milk and cow's milk.

Common European goats are derived from Capra aegagrus, the goat of ancient Persia and Asia Minor
### Percentage composition of various milks

<table>
<thead>
<tr>
<th></th>
<th>Fat</th>
<th>Protein</th>
<th>Lactose</th>
<th>Minerals</th>
<th>Total solids</th>
<th>Water</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saanen</td>
<td>3.5</td>
<td>3.2</td>
<td>4.6</td>
<td>0.8</td>
<td>12.1</td>
<td>87.9</td>
</tr>
<tr>
<td>Anglo-Nubian</td>
<td>4.8</td>
<td>3.4</td>
<td>4.6</td>
<td>0.8</td>
<td>13.6</td>
<td>86.4</td>
</tr>
<tr>
<td><strong>Cows</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jersey</td>
<td>5.0</td>
<td>3.4</td>
<td>4.8</td>
<td>0.8</td>
<td>14.0</td>
<td>86.0</td>
</tr>
<tr>
<td>Friesian</td>
<td>3.8</td>
<td>3.0</td>
<td>4.6</td>
<td>0.8</td>
<td>12.2</td>
<td>87.8</td>
</tr>
<tr>
<td><strong>Human</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.55</td>
<td>1.52</td>
<td>6.50</td>
<td>0.45</td>
<td>12.02</td>
<td>87.98</td>
</tr>
</tbody>
</table>

However, an important difference is that the fat globules of goat's milk are smaller than those of cow's milk and the cream rises to the top more slowly if goat's milk is left standing. The curd tension of goat's milk is also much softer than that of cow’s milk and this, with the smaller fat globules, makes goat's milk more easily digested than cow’s milk. Whilst this is of no great consequence for most purposes, it is very important to people with certain digestive complaints, particularly some infants, invalids and convalescent persons.

Goat's milk can also be of value to individuals who have become allergic to particular proteins in cow's milk. A change to goat’s milk may permit a spectacular and complete recovery.

**PURCHASING GOAT'S MILK**

Those who need goat's milk may elect to buy the milk or may prefer to buy a goat if they have enough area available and Shire regulations permit the keeping of goats in the locality. Those who want milk must pay more for it than for cow’s milk because production costs are higher. In general, the cost will be about half as much again, or twice as much as for cow’s milk. People wanting a regular supply should contact their local milk vendor, who may be able to obtain a supply, or contact the Goat Breeders Society, c/o The Royal Agricultural Society, and obtain names of producers living in their locality.

**DAIRY GOAT BREEDS IN AUSTRALIA**

Dairy goats in Australia are based on European breeds and are restricted to four breeds or crosses between them. Some crossing has also occurred with Angoras in flocks which roam northern and eastern parts of the State.

**The Saanen**

The most common breed of goat is the Saanen or British Saanen, the latter usually being a larger animal with a shorter, sleeker coat and longer legs than the pure Saanen. It is a good milk breed which holds many Australian records.
The Saanen is usually white in colour but may be a pale cream or very pale biscuit colour with short, erect ears. Because they may be sensitive to strong sunlight they should be selected for tan skins.

Saanen milk has a relatively low fat content, rather similar to milk from the Friesian cow.

**The British Toggenburg**

Toggenburgs are from fawn to dark chocolate in colour, with white facial lines, white legs from the knees and hocks downward, and white on the belly. They also have some white on or about the tail and their ears are erect.

The Toggenburg is a hardy breed capable of good year round performance with milk of similar composition to the Saanen.

**The British Alpine**

The British Alpine is black in colour with white markings on its face and legs. It produces milk of similar composition to or slightly richer than Saanen's milk.

**The Anglo-Nubian**

Anglo-Nubians are variously coloured but can be recognised by their long drooping ears, Roman nose and large frame. They are not very heavy milkers but their milk has high fat and protein percentages, making its compo-
sition more comparable to that of a Jersey cow. The breed is also said to adapt better than the others to hot and humid conditions, being of Asian origin. It has a well-fleshed frame and longer legs, giving the udder better ground clearance.

BUYING A DAIRY GOAT
Dairy goats in production or on point of kidding may be purchased from registered studs. A list of studs is available from the Goat Breeders Society but unregistered goats may be located, for example, through the “Livestock” columns of daily and weekly newspapers.

When buying a doe in milk, it is wise to buy one not more than four years old as this leaves about half the animal’s useful life in front of it. To assess its milking ability, see it milked right out in the evening and then be present to see it milked out again the following morning.

After the udder is milked out, examine it for lumps and thickenings which may indicate mastitis or other udder trouble. The udder should be shrunken, silky and soft, and its surface free of warts and sores. The teats should also be free of thickenings and sores, especially at the orifices. Teats of medium length, which are easy to milk, are preferred.
You should also open the lips to examine the teeth and ensure that there are eight sound biting teeth on the lower jaw.

The general health and appearance of the doe should be good, and if she has been in milk for more than seven months she should again be in kid. It is also important that a goat can be easily caught and has a docile temperament.

An alternative way of getting started with goats is to buy and rear one or more young female kids. It is usual not to mate young goats until they are 19 months of age when they can kid down and come into production at two years. It always pays to buy a good quality animal from reliable milking stock.

**MILKING PERFORMANCE**

An average milking goat will produce 2 to 3 litres of milk each day during a lactation period of 7 to 10 months. The amount produced depends upon the breeding, management and feeding it receives, and higher averages can be obtained with well-bred does which are well fed. Most goats can produce 4 to 5 litres a day just after kidding but this level is not usually maintained for long.

A few dairy goats in Australia have recorded more than 3 000 litres of milk a year, but under
average conditions most produce nearer to 750 litres.

Does are usually mated to kid every 12 months although many well-bred does continue milking for two years without re-mating. Milk production is less in the second year but may still be sufficient for normal household requirements.

**MATING**

The natural breeding season for goats is autumn when all does begin to come into season regularly. April and May appear to be the best months for mating, but it may be done earlier or later than this. Some does however do not cycle regularly at other seasons of the year and must be mated in autumn. With an average gestation length of 150 days, autumn matings result in kids being born in spring when plenty of grazing is available and there is consequently a good milk flow for the kids.

Provided they are well grown, kids born in early spring can be mated the following autumn to come into production at a little over 12 months of age (over 30 kg). Although early mating is not thought to have a detrimental effect on the productive life of the doe it is usual to mate kids for the first time at about 19 months of age so that they come into production at 2 years.

When several does are kept for home milk supply, some should be mated very early in the breeding season and others late enough to ensure an all year round milk supply.

**Signs of oestrus**

Does will accept the buck only when they come into oestrus, which recurs at 21-day intervals during the breeding season. Oestrus may last from a few hours to 2 or 3 days, but usually for about 24 hours, with signs of restlessness, frequent bleating and persistent shaking of the tail. There is also a temporary reduction in milk yield if lactating, and the vulva is reddened, swollen and slightly relaxed with a mucus or slightly blood-stained discharge.

For various reasons the buck should not be run with the does, even during the breeding season. The main reason is that the bucks’ odour can contaminate the milk, giving it a goat’s flavour.

As each doe comes into season and is to be mated she should be taken to the buck for service. If properly in season, the doe will stand quietly and the buck should be restrained and allowed to serve her once only. If still in season the next day she is more likely to conceive if given a further service, because the eggs are shed towards or after the end of oestrus.
The date of service should be recorded and a close watch kept on the doe 18 to 25 days later. This is the time she would again come into oestrus if she is not in kid.

It is seldom necessary for a person with only a few does to retain a buck as arrangements can usually be made to use a well-bred buck standing at a stud. This is an advantage because during the mating season in particular the buck exudes an unpleasant odour from glands at the base of the horns. Unless these glands are surgically removed, keeping mature bucks near houses is undesirable. In addition of course, using a well-bred buck increases the likelihood of producing good kids.

The first evidence that a doe is in kid is her failure to come into oestrus, although this is not always an infallible guide, particularly if she was mated late in the breeding season. Her appearance can also be misleading until late in the gestation period when a more positive sign is the springing or enlargement of the udder which takes place as kidding approaches.

**CARE OF THE IN-KID DOE**

Developing young make most of their growth in the last month before kidding and there is little extra demand on the doe for at least three months after mating. However, before her first kidding, a young doe needs extra feed in order to be well grown. This applies particularly to does mated whilst still under 12 months of age.

The doe’s gestation periods average 150 days and probably 80 per cent kid between 148 and 153 days after mating. Nevertheless, in extreme cases, kidding may be as much as 10 days either side of the expected date without harmful effects to the dam or offspring.

A pregnant, lactating doe may be milked and fed as usual until about six weeks before the expected date of re-kidding. She should then be dried off to allow a period for body condition and udder tissue to build up for the next lactation. Failure to allow this will result in lower production in the new lactation.

Drying off can be achieved simply by not milking the doe, and this is recommended for most goats rather than incomplete or less frequent milking. Not milking allows milk to accumulate in the udder, so causing pressure build up and resorption of milk constituents into the blood stream. The doe suffers little discomfort and no harm.

With more persistant does milking once a day and then every second day may be necessary.

During the few weeks before re-kidding the doe should be fed an increasing amount of high quality feed, preferably the same sort of food she will be eating after kidding. This will not only bring her into good condition but will also get her used to the production ration.

If the udder becomes too distended before kidding the doe can be partially milked out.

**CARE OF THE DOE AT KIDDING**

Signs that kidding is close at hand include filling and distension of the udder, hollowing of the flanks, swelling of the vulva, and a general relaxation of hindquarter muscles. In mild weather the does can be allowed to kid in the open on a clean grassy area reserved for the purpose, or, alternatively, they can be taken into a thoroughly cleaned and disinfected stall with the floor covered with clean straw or other suitable material. Generally they have little trouble kidding and are best left undisturbed.

The first young is normally born shortly after the water bag appears and bursts, and if others are to come they appear at short intervals. The membranes usually come away and labour is complete within a few hours. The act of kidding should take no more than four hours from the onset of labour.

Normal birth position is for the extended forelimbs of the kid, with the head resting on them, to appear first. Less commonly the extended hind limbs may emerge first.

Difficulties in kidding are usually associated with one foreleg or the head being bent backwards. If this is delaying kidding assistance may be needed by cleaning the hand in disinf ectant and inserting the bunched fingers into the vagina. Between periods of straining the various parts of the kid can then be identified and arranged in the correct position, possibly after pushing back inside the doe any parts of the young which have emerged. If further assistance is needed this may be given by gentle pulling at the same time that the doe is straining.

Veterinary assistance should be sought during periods of prolonged labour.

As kids are born the doe licks them clean and they soon struggle to their feet. Once they have found the teats and commenced to suckle there is nothing further to worry about.

Once kidding is complete and the kids are on their feet the doe should be offered a warm drink of gruel. This may be followed an hour or two later by a warm bran mash made by
pouring one litre of boiling water over one kilogram of bran with a teaspoon of salt added, the mash should be mixed well and covered with an old towel until it is cool enough to be fed.

**MANAGEMENT FROM BIRTH TO KIDDING**

**The young kid**

Goats are prolific breeders and the incidence of multiple births, particularly twins, is high. About half the does that kid have twins and triplets are almost as common as single births. Less commonly four kids are born at a single kidding.

The birth weight of buck kids is typically 3 to 4 kg but doe kids weigh a little less. Buck kids lighter than 2.8 kg, or doe kids lighter than 2.5 kg at birth tend to be less robust and seldom grow into big animals.

Shortly after the kids are born they should be examined for abnormalities, particularly of the genital organs. Intersex conditions are not uncommon and usually take the form of slight departures from normal development. In the female this appears as an enlarged clitoris, or in the male it may be minor departures from typical anatomical structure whereby urine is passed through an opening somewhat behind the normal sheath. The grosser manifestations of the intersex condition are easily identified.

Kids of both sexes with any degree of the intersex condition will not breed and are best destroyed as soon as they have been identified. The teats of the female kid should also be examined as double teats and supernumerary teats sometimes occur. Kids with abnormalities should not be retained.

It is assumed that there is a genetic link between the polled condition and intersex as a greater proportion of intersex offspring results from matings between two polled goats. Where one or both parents have horns or have been dehorned the condition is not common.

**Rearing to weaning**

During the first 4 to 5 days after kidding goat's milk is not normal in composition and is unsuitable for human consumption. It contains more than usual amounts of proteins and is rich in antibodies which protect the kids against disease common in the environment. This milk is known as colostrum and, as a kid's capacity to absorb antibodies into the blood stream drops off rapidly, it is important that kids to be kept in the herd are allowed to suckle the doe in the first few hours. Kids can then be left with the dam for up to 4 days before separation, or separated and bottle fed.

Kids may be left with the mother during the suckling period but it is usual to remove and hand-rear them when the goat's milk is required for human consumption. If reared on the doe they tend to become wilder and less manageable, and are less suitable as milk goats later in life.

After removal from the doe the young kids should be fed on fresh goats milk for at least two weeks. They need feeding four times a day for the first fortnight and then twice a day until weaning at about 12 weeks. Milk is best warmed to blood heat for feeding.

It is wise to weigh the kids weekly and feed according to weight, giving them 20 per cent of body weight each day. For example, a kid of a few days old weighing 4 kg would be given 0.8 litres (.8 kg) of colostrum or milk per day, i.e. four feeds each of 0.2 litres.

Well managed kids grow at the rate of about one kilogram per week so that the milk ration should be increased by about 0.2 litres each week. The increase in milk feeding should go on until the kid is receiving two litres of milk daily, probably by about the seventh week.

No further increase in milk feeding is necessary as by the seventh week the kid will be eating other forms of dry feed.

**Substitutes for goats milk**

When supplies of fresh goats milk are unavailable milk substitutes may be used, though preferably not before the kids are two weeks old. Then, over a period of two weeks, a gradual change can be made to cows milk. Whole milk will give rapid growth but if this is too expensive a reconstituted skim milk can be substituted. This is then prepared by mixing 1 part of skim milk powder with 8 parts of water. (The mixing is easiest done using warm but not hot water.)

As skim milk has the fat removed it retains only about half the energy content of whole milk and results in slightly lower growth rates. The vitamins A and D are also missing and may need to be supplied as a supplement, particularly if green feed is unavailable or the kids are kept indoors. Several proprietary supplements containing both vitamins are available and should be fed according to the manufacturers instructions so as to provide about 1000 International Units of Vitamin A daily.
Kids are generally weaned at about 18 kg or 12 weeks of age, but may be weaned earlier or later depending upon availability of milk or milk substitute, the availability of alternative feeds and the need to maintain rapid growth. However, they should not be weaned until they are eating and have been conditioned to eat alternative dry feeds. Generally though, unless the young does are to be mated at 7 to 8 months, weaning at 8 weeks will not harm them.

Most stud breeders wean at 5 to 6 months as they find this achieves a better growth rate.

Supplements to liquid milk

Very young kids will nose about in feed and pasture but will not commence to eat it until 3 to 4 weeks old. At this stage a concentrate meal and some hay or chaff should be provided. The meal should be readily digested and contain about 14 per cent crude protein. Two suitable meals would be:

- Crushed barley—5 parts by weight
- Bran—2 parts by weight
- Linseed meal—1 part by weight

- Crushed oats—3 parts by weight
- Crushed barley—3 parts by weight
- Crushed lupins—1 part by weight

In both cases 1 per cent each of sterilised bone flour and salt should be added.

At 4 weeks of age kids will eat about 30 g of such a ration per day and it should be fed to appetite until consumption rises to 120 g per day. It should then be kept at this level until well after weaning. At the same time hay should be fed to appetite or the kids should have access to good quality pasture and browsing.

The nutritional disease "bent leg" in kids is caused by excess calcium in the diet and, as a precaution, kids should not be given ground limestone and should not be grazed on pastures with a high clover or lucerne content. If possible they should also have access to coarse roughage such as shrubs and tree branches.

When more than one kid is being reared the sexes should be kept separate after about 10 or 12 weeks when the young bucks become active.

Rearing beyond weaning

After weaning kids should be reared on good quality pasture or browsing but they should be kept off high legume content pastures up to 9 months. The quantity and quality of grazing available, and the growth rate required, will determine the need for concentrates and for hay or chaff.

If grazing is insufficient or unattractive kids up to 9 months should be given about 120 g per day of one of the meals referred to earlier. After 9 months this quantity needs to be doubled. Such a ration is suitable until the "steaming-up" period three weeks before kidding when a change should be made to a production ration.

FEEDING THE MILKING GOAT

Being ruminants goats have both a true stomach and a rumen where food is attacked by bacteria and broken down to fatty acids. By this means roughage foods high in fibre indigestible in the true stomach can be utilised efficiently. Ruminant digestion however also carries the penalty that concentrate feeds such as grains are used less efficiently than in single stomach animals because there are some losses in the rumen.

The goat is thus well equipped to handle roughage foods such as fibrous pasture, hay and shrubs, and maximum use should be made of these as they are usually available quite cheaply per unit of digestible energy. Supplementing leafy green pasture with barley or other grains seldom pays even though milk production rises a little. It is only when summer paddock feed is of poor quality that grain supplements are worthwhile.

Despite this generalisation, more milk can be obtained by increasing concentrate feeding. Therefore, if the need for milk is great, or pasture is low in quantity or quality, concentrate feeding may be justified.

Food nutrients

The goat's diet should include the following nutrients.

Digestible energy

A shortage of digestible energy in the diet is the most common cause of poor condition and low production of West Australian goats.

Energy is usually available from carbohydrates such as sugars and starches in feed, but the goat can also digest celluloses with equal efficiency. Surplus protein can also be used as a source of energy, as can the various fats and oils.

If the quantity of feed on offer is not limiting, and the feed is palatable, average digesti-
bility of food should be not less than 60 per cent for dry goats and 70 per cent for goats in production, or for young, rapidly growing goats. Digestibilities of many common foods are given below.

**Protein**

A dry goat maintaining condition has a rather low protein requirement; about 10 per cent crude protein in the ration being adequate. Once in production the requirement increases and a goat in full milk needs about 14 per cent crude protein in its ration.

**Minerals**

The only minerals likely to be deficient in the ration of goats are calcium and phosphorus but on well fertilised pastures these are probably in adequate supply. Common salt (sodium) increases the palatability of rations but is unlikely to ever be deficient. If in doubt prepare a mineral lick consisting of:—

Salt 50 parts
Finely ground rock phosphate 50 parts
Copper sulphate 0.5 parts
Cobalt sulphate 0.25 parts

This mixture can be added at 1 part per 100 parts of feed concentrate.

Proprietary stock licks are also available and may be purchased and fed to recommendation.

**Vitamins**

Ruminants become vitamin deficient only if they have no access to green feed for 6 months or more (vitamin A), or if kept indoors with no access to sunlight (vitamin D).

When compounding a ration you need to know the likely digestibility and protein content of the materials available. These are shown below for some common feeds:—

<table>
<thead>
<tr>
<th>Material</th>
<th>Digestibility</th>
<th>Crude protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry paddock feed</td>
<td>20-45</td>
<td>4-8</td>
</tr>
<tr>
<td>Hay</td>
<td>40-65</td>
<td>8-14</td>
</tr>
<tr>
<td>Summer crop</td>
<td>60-75</td>
<td>8-16</td>
</tr>
<tr>
<td>Poor green pasture</td>
<td>45-55</td>
<td>11-13</td>
</tr>
<tr>
<td>Good green pasture</td>
<td>65-75</td>
<td>17-22</td>
</tr>
<tr>
<td>Bran</td>
<td>53</td>
<td>14-5</td>
</tr>
<tr>
<td>Oat grain</td>
<td>75</td>
<td>8-9</td>
</tr>
<tr>
<td>Pollard</td>
<td>81</td>
<td>15</td>
</tr>
<tr>
<td>Barley or wheat grain</td>
<td>85</td>
<td>9-10</td>
</tr>
<tr>
<td>Lupin grain</td>
<td>85</td>
<td>28-38</td>
</tr>
<tr>
<td>Rapeseed or linseed meal</td>
<td>85</td>
<td>38-45</td>
</tr>
<tr>
<td>Meat meal</td>
<td>80</td>
<td>45-55</td>
</tr>
<tr>
<td>16% pellets</td>
<td>85</td>
<td>16</td>
</tr>
</tbody>
</table>

**How much to feed**

Total feed intake in a day is determined by a number of interacting factors including the palatability and availability of feed, and the level of production which affects the appetite of the animal. Perhaps the main reason one goat is a good producer and another not so good is that one has the ability to eat more than the other.

In general, a lactating goat eats the equivalent of about 4 to 5 percent of its body weight in dry matter per day. For a typical goat of 70 kg liveweight this is 2.8 to 3.5 kg dry matter per day, or in terms of hay or grain, about 3.0 to 3.8 kg of feed per day. In terms of green succulent feeds intake could be up to 5 or even 10 times the weight of dry matter.

Where some pasture or browsing is available a standard recommendation would be to rely on this for maintenance and to feed a supplement for production at the rate of 1 part per 2½ parts milk (for example 1 kg per 2½ litres of milk). This is alright as a general recommendation but it underrates the value of good succulent feed as a production ration and may not be a very economic ration.

**Comments on concentrates**

**Barley** is probably the best of the readily available grains to feed, being safer than wheat and having a higher energy content than oats. However, care is needed to change gradually to a ration high in barley.

**Wheat** is likely to lead to digestive upsets if great care is not taken to introduce it gradually, but it can make up 25 per cent of any concentrate ration fed to goats.

**Oats** is the safest cereal grain but because of its lower energy content it is not as good as barley for boosting a low energy roughage.

**Pollard** is safe to feed but is a little dearer than barley and has no advantage over it.

**Bran** cannot be considered as an energy concentrate as it is no better than average quality hay. It has some value as a laxative however and can be recommended for newly kidded does.

**Linseed meal** is a traditional protein concentrate but is now dear and in short supply. It can be satisfactorily replaced by lupin meal or by rapeseed meal although the latter is less palatable. (The addition of a small quantity of aniseed may help goats accept rapeseed, after which the aniseed can be left out.)
Lupin meal is an excellent source of protein and can be fed with safety to supply the protein needs of lactating goats.

Compiling rations
If it is remembered that a goat in production needs a ration with overall digestibility of not less than 70 per cent and containing not less than 14 per cent crude protein, the table of food values (page 10) can be used as a guide for compiling rations. This has more practical application under fully hand fed conditions than under grazing (where it is difficult to estimate pasture intake) but there are situations where knowing food values will help compile a good diet for the animal.

For instance, to ensure energy is not limiting, let us assume feeds available are hay or grazing at 65 per cent digestibility (typical winter grass and clover mixture), and barley grain at 85 per cent digestibility. Knowing that overall digestibility should be 70 per cent the necessary proportions of grazing and barley can be calculated using the following technique—

<table>
<thead>
<tr>
<th>Grazing</th>
<th>65</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td></td>
<td></td>
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<tr>
<td>Barley</td>
<td>85</td>
<td>5</td>
</tr>
</tbody>
</table>

The “calculation” indicates that the requirements will be 15 parts of grazing to 5 parts barley. As total intake would be about 2.8 kg of air dry feed per day (page 10), a doe would have the correct energy concentration in her ration if she received 0.7 kg of barley and 2.1 kg of roughage per day.

Depending on whether the basic feed was hay or green feed with high protein content, the total ration could still be deficient in protein. On hay the barley would need to be replaced by a barley-lupin or barley-linseed mixture with 4 parts barley to 1 part lupin or linseed to bring the mixture to about 16 per cent protein.

HOUSING GOATS
Goats suffer from cold and it is necessary to shelter them from rain and cold in winter, and to protect them during very hot weather in summer. Note however that goats must not be permanently housed within 20 metres of the dairy premises.

Buildings to shelter goats should be on a well drained area—if possible on gently sloping land—and big enough to accommodate the goats without overcrowding.

Concrete foundations are desirable whatever the style of building and the floor should be covered with dry leaves, dry grass, straw, chaff, sawdust or wood shavings. On no account should goats be permitted to lie on material which is not dry. Proper ventilation is also important but drafts must be avoided.

MILKING
Goats are mostly milked by hand, usually from the right side. Before milking the udder and teats should be thoroughly cleaned with running water and it is an advantage to give the animal a quick groom to prevent hairs from falling into the bucket. After milking, dipping the teats in an iodophor or sodium hypochlorite solution will help prevent mastitis.

Frequent milking tends to increase yield but it is usual to milk twice per day at close to 12 hour intervals. Regularity and completeness of milking are big factors in keeping up milk flow. Milking should always been done carefully as rough handling will pre-dispose the animal to mastitis.

Large commercial dairies are now being equipped with milking machines which enable goats to be milked out in about two minutes. Many also have a number of stands to allow more than one goat to be milked at a time. Such machines must be correctly adjusted and the cups removed as soon as the milk flow has ceased. As with milking machines for cows they must be carefully cleaned and regularly maintained.

POINTS OF MANAGEMENT
Disbudding or dehorning
Horabuds on a kid can be destroyed with a caustic potash stick, the caustic being applied with about half a minute of firm rubbing. Any discharge must then be kept away from the kid’s eyes by ringing the area around the emerging horn and around the eyes with vaseline. The treatment may be repeated if the horn begins to re-grow.

The hot iron method is generally more successful than a potash stick. A metal nut just the size to cover the horn bud is welded onto an oxywelding rod and heated to a dull red with a blow torch. The implement is then
pressed on the horn bud firmly for 60 seconds to destroy it.

Older goats may be dehorned with cup dehorners as used for cattle.

Care of the feet
Goats run under conditions where the horn of the feet is not worn down as fast as it grows should have their feet trimmed every 4 to 6 weeks. Unless the feet are trimmed the horn becomes long and distorted and the goat may become lame. Trimming is best done by supporting the hoof and paring off excess growth with a sharp knife or rasp, working from heel to toe. The thick outside horn of the hoof should be pared level with the sole and the heel trimmed to remove excess growth.

Surplus male kids
If male kids are not wanted for stud purposes or meat they should be killed at birth. Only male kids from the best quality stock should be retained for breeding and kids intended for meat should be castrated at 10 to 20 days of age. Kids for meat should be killed at 3 to 6 months when they make excellent eating and resemble lamb in flavour. Many people prefer to eat them at 3 to 6 weeks and consider the meat a delicacy.

Estimating the age of a goat
Goats’ teeth can be used to estimate their age. In their first year goats have eight baby teeth, these being small with gaps between them. By 24 months the two middle teeth are replaced by permanent teeth which are much larger with little or no space between them. During the third year two more baby teeth are lost and replaced by permanent teeth, and there are six large permanent teeth at four years and eight by five years. In rare cases the complete set of permanent teeth may be present up to a year earlier than normal.

Like all ruminants, goats have teeth in the lower jaw only and chew against a hard pad on the upper jaw. With older goats experienced persons can estimate their age with reasonable accuracy by the amount of wear that has occurred.

COMMON AILMENTS
Correct feeding, hygiene and attention to general care and management can do much to reduce the incidence of many of the common ailments of goats. In this section some of the more common ailments are described, along with methods of preventing the problem. Suggestions for disease treatment are offered where possible but it should be appreci-
ated that where veterinary assistance is available it is preferable to first-aid treatment.

**Enterotoxaemia**

Enterotoxaemia is a common and serious disease likely to affect goats of all ages though it is usually seen in goats in good condition which have been milking for a few weeks. In the acute form the goat is usually found dead or dies in a few hours. Before death it shows signs of acute abdominal pain, twitching and grinding of the teeth. Blood stained diarrhoea may occur. If the disease is not so acute the goat loses its appetite and has diarrhoea which may contain shreds of mucous membrane and blood. This may go on for some days during which milk production drops sharply and the animal may die. In the chronic form of the disease diarrhoea may continue for several months.

To prevent losses from enterotoxaemia all goats should be vaccinated using the same vaccine used for sheep. The dose is given by injection under the skin, preferably in the side of the neck, by lifting a fold of skin between the fingers and injecting into the space formed under the fold. The first dose is 5 ml, followed by a second dose of 5 ml four weeks later. A single booster dose a fortnight before kidding gives immunity to the kids for a short period but if the does have not been vaccinated kids may have their first injection at 3 days. They are then adequately protected after the second dose has been given. If the doe has been vaccinated wait until the kid is a fortnight old before giving the first vaccination.

**Scouring**

Scouring of goats is very common and may be caused by a great variety of disorders. The most frequent cause is worm infestation, followed by chronic enterotoxaemia or coccidiosis. Other causes are irritant weeds, unsuitable feeding or bowel infections. Generally a soothing preparation such as Kaomagna (Wyeth) or a mixture containing 15 g powdered charcoal, 15 g powdered chalk, 6 g powdered ginger and 6 g sodium bicarbonate may be given daily. If the scouring appears to be caused by an infection, Sulphamezathine, or Sulphadimidine tablets or powders are available for use.

**Mastitis**

Although seldom causing deaths in milking does, mastitis frequently causes a permanent loss of production by producing fibrous tissue in the udder. Mastitis may take an acute form or a less obvious form depending on the type of infection present.

Acute mastitis is characterised by a hot, painful swelling of one or both sides of the udder. An affected side is hard to milk and the secretion may be watery or bloodstained.

Chronic mastitis can be the outcome of a previous acute attack or may occur independently. The milk appears normal or may contain a few clots, or may have a curdy, stringy, slurry or watery appearance. Deep-seated hard lumps high up in the gland are not uncommon and are caused by deposits of fibrous tissue.

Does suffering both types of mastitis are carriers of infection which can be passed to other does on the hands of the milker, on udder washing cloths or during machine milking.
Does affected with mastitis should always be milked last and the milk from seriously affected quarters directed into a tin containing antiseptic and then destroyed. Other methods of prevention include use of running water for washing udders before milking, non-use of udder-cloths or use of individual cloths for each goat, and immersion of teats in a weak iodophor solution after milking.

Where machine milking is used it is important that the machine is correctly adjusted, that cups are removed as soon as milk flow has finished and that strict hygiene is practised.

Treatment is by squeezing the contents of a tube of antibiotic preparation through the teat canal into the udder after milking, and repeating this daily for three days. The milk should not be used for three days after treatment. A longer lasting antibiotic treatment is available from veterinary surgeons and is recommended when the doe is dried off at the end of lactation. This may cure many cases and prevents infection during the dry period.

Milk fever
Milk fever generally affects heavy milkers at their second, third and fourth kid, and almost always occurs within a few days after kidding. It is believed to be caused by a sudden calcium imbalance caused by the onset of lactation. Symptoms include loss of appetite and an unsteady gait, followed by the animal going down and lying in a typical position with the neck out stretched. It quickly becomes comatose and death may follow if treatment is not applied.

Veterinary treatment by injecting calcium borogluconate into a vein gives rapid recovery unless there are complications.

If there is no veterinarian a solution can be injected into three or four sites under loose skin on the neck. Proprietary solutions can be used, or a suitable material can be prepared by mixing 25 g of calcium borogluconate in 100 ml of boiling water, then cooling the solution to blood heat before injection.

Subcutaneous injection is slower acting than intravenous but the doe should recover within 1 or 2 hours. After injection she should not be milked out for 24 hours and then only a small quantity should be withdrawn, increasing the quantity over 2 to 3 days until resuming normal milking.

Retained afterbirth
Part of the afterbirth is often retained by does which have had a difficult kidding, especially where assistance has been necessary. The entrance to the uterus becomes tightly closed from 3 to 4 days after kidding, and afterbirth retained begins to putrify often causing infection in the uterus. Symptoms may include a chocolate coloured gelatinous discharge from the vagina, which soils the tail and hind-quarters. Appetite also becomes poor, milk yield drops and the doe loses condition.

It is a wise precaution to check that afterbirth is complete and comes away within a few hours of kidding. Early veterinary assistance should be sought if any afterbirth is retained because of the chance of fatal blood poisoning occurring.

Sore teats
Chapped or cracked teats may occur if the teats are not dried after milking, particularly in cold weather. Teats may also be torn by barbed wire, thorns or other sharp protrusions. Any such small wounds should be treated by dressing with an antiseptic solution such as dettol, drying, and then binding the teat with adhesive plaster to draw the edges together.

Cracked teats should be smeared twice daily after milking with a softening antiseptic ointment. A suitable material can be prepared from 3 parts lanolin, 3 parts vaseline and 1 part salicylic acid.

Pink-eye
Pink-eye (contagious ophthalmia) is spread by flies or dust and occurs more commonly in hotter drier months. The first sign of the disease is a watery discharge from the eye, followed by congestion of the mucous membrane and development of a whitish film covering the eyeball. There may be temporary or complete blindness and, in severe cases, the eyeball may rupture.

Treatment is given by squeezing “Pink-Eye” ointment into the corner of the eye night and morning for several days until symptoms disappear. Aerosol applicators are also available.

Ringworm
Ringworm is caused by a fungus which affects the hair fibres and follicles causing the hair to drop out and leave circular bare patches. The fungus is readily transmitted by contact to humans and other goats.

Treatment is given by applying tincture of iodine once daily or if the skin is tender, as in kids, by applying Zephiran (1 part Zephiran concentrate and 6 parts water), a non-irritant liquid available from pharmacies.
Treatment should be continued until fresh hair growth emerges.

**Worm infestation**

Heavy worm infestation may be responsible for lowered production and serious loss in condition. Younger animals are more likely to suffer, particularly if they are down in condition, but animals of all ages can be affected. In extreme cases the animals may die.

There are no definite symptoms of worm infestation, apart perhaps from loss of condition and frequent scouring. Usually however the coat becomes harsh and stary, there is a gradual loss of appetite, and, in lactating does, a progressive lowering of milk production.

A number of reliable worm drenches are now available and routine drenching every 6 to 8 weeks can be recommended. Prevention is far preferable to treatment and good feeding helps prevent a buildup of worms in the stomach or intestines. Grazing rotations also help as the worms spend part of their life cycle outside the body. Note though that worm eggs can survive for long periods, particularly in damp shaded places.

**Lice**

Goats can become infested with both biting and sucking lice which may be seen as small yellow or white bodies close against the skin of the animal, particularly around the neck. Infested goats lose condition, fall off in milk production, and take on a rough unkempt appearance because of their constant biting and rubbing against projecting objects to relieve irritation.

Treatment is by spraying or dipping, using any of the organophosphate sheep dips available. Treatment should be carried out regularly each year in late summer, early autumn or whenever lice infestation is suspected.

**Plant poisoning**

The goats' natural habit of browsing rather than grazing and their tendency to forage in strange places causes them to be poisoned by plants or chemicals far more than other domestic stock. Where goats are kept care should be taken to ensure there are no paint pots, discarded motor car batteries or similar rubbish.

Many bush and garden plants are poisonous to goats and great care should be taken to ensure that all plants in the garden and surrounds are non-toxic before goats are let off the tethers. Prunings and clippings should also be checked for toxic varieties before being placed where goats can get at them.

Amongst common garden plants the following can be listed as dangerous. The list is not complete, so plants suspected of being toxic should be checked with the Department of Agriculture's Botany Branch before the goats are allowed access.

- **Rhododendron and azalea**
- **Prunus**
- Arum lily (*Zantedeschia aethiopica*)
- Hemlock (*Conium maculatum*)
- Oleander (*Nerium oleander*)
- Winter sweet (*Carissa spectabilis*)
- Angels trumpet (*Datura arborea*)
- Castor oil plant (*Ricinus communis*)
- Lantana (*Lantana camara*)
- Poinsettia (*Euphorbia pulcherrima*)
- Privet (*Ligustrum vulgare*)
- Duranta (*Duranta repens*)

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