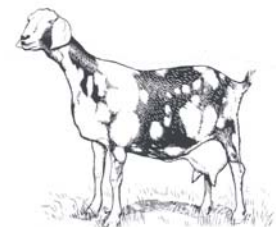


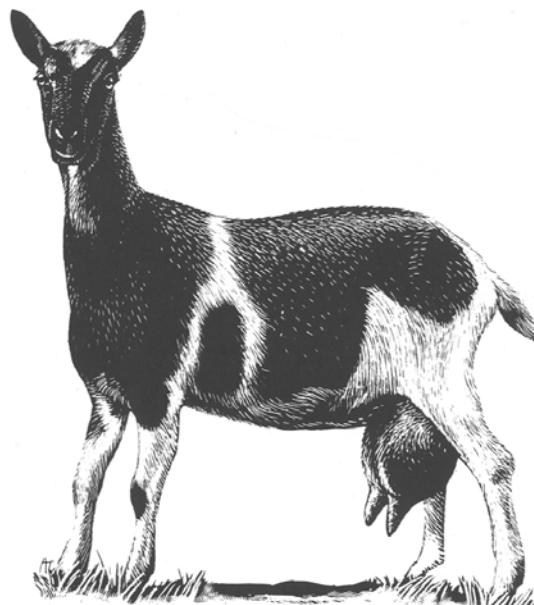
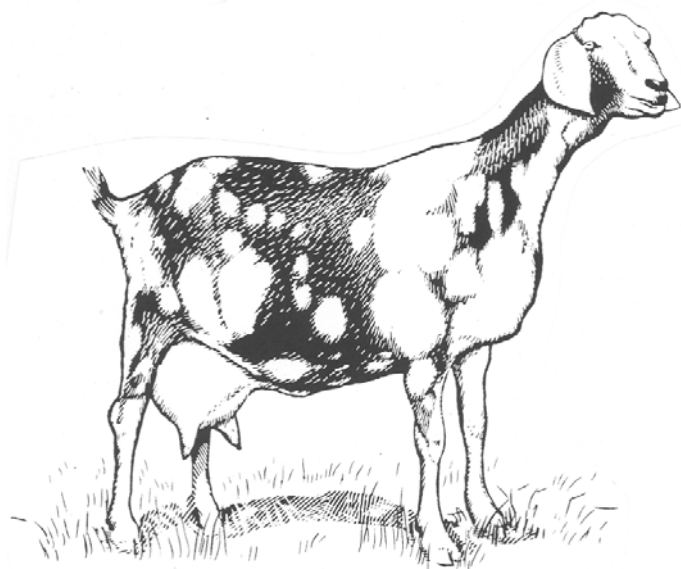


# **NUTRIFAX**

**Nutrition News and Information Update**



# **FEEDING AND MANAGEMENT OF DAIRY GOATS**



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Shur-Gain, A Member of Maple Leaf Foods Inc.

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## Introduction:

The popularity of milking goats has increased over the past few years. Goat milk has specialized markets due to its unique composition. It has higher digestible protein and fat content compared to cows' milk. Also, not requiring quota has made it much easier for people to get into the industry. Proper feeding and management of dairy goats is essential not only to maximize production but to also maintain good animal health.

## Breeds of Goats and Milk Production:

There are many different breeds currently being used for milk production. The most common in Ontario include:

**The Alpine:** Alpines are a medium to large Swiss breed of goat. They are excellent producers with a long lactation and hold up well in hot weather. They are hardy and adaptable and thrive in any climate.



**The Nubian:** The Nubian is a relatively large dairy goat of Oriental origin. This goat was bred as a dual-purpose animal, producing both milk and meat. They will produce a reasonable amount of milk but will have a higher milk fat percentage compared to other breeds of goats. Nubians are characterized by their long, drooping ears.



**The Saanen:** The Saanen is a swiss breed of dairy goat generally regarded as the largest of the dairy breeds along with the heaviest milk producer (often considered the Holstein of dairy goats). They are generally white or cream in colour.



**The Toggenburg:** Toggenburgs are the smallest of the dairy goats. They are various shades of brown with distinctive white marking. They are known for their high, well- attached udders and high production but low butterfat.



**La Mancha:** The most distinguishing characteristic of the Mancha is the size and shape of their ears. They are very small and “Gopher like”. They are a relatively small breed of goat and have good milk production and butterfat.



Dairy goats peak in milk production at 5-5.5 l/d at 6 to 8 weeks into lactation. They typically decline in production by 10-15% after their peak. An official lactation for a doe is 305 days with an average milk production of 2.5 l/h/d.

Table 1. Representative Production Data

Breed	Body Wt (lb.)	Milk Production (lb/lactation)	Fat %	Protein %
Saanen	135	2468	3.4	2.9
Alpine	135	2254	3.5	2.9
Toggenburg	120	2015	3.2	2.7
LaMancha	130	2097	3.9	3.1
Nubian	135	1749	4.8	3.7

2002 ADGA breed averages for milk yield and composition

## General Information:

Doelings reach puberty by 6-8 months of age and are usually bred at 7 to 10 months of age. At the time of breeding they should weigh about 80-90 lbs (60% of adult weight). For two to three weeks prior to the breeding season does and doelings should be gaining weight (increase the amount of energy being fed). This will result in an increased number of ovulations. Estrus cycles average 21 days with a range from 15 to 24 days. Does show standing heats for up to 18 hours. Signs of heat include prominent tail wagging, restlessness, bleating, loss of appetite, lower milk production, mounting of other goats, red or swollen vulva and mucous discharge. The gestation period is 145-155 days (5 months). Maiden does usually have singles while mature does have one to five kids with the most having twins or triplets. The normal breeding period for a goat is from late August to mid-March (normally in September, October and November). They will generally produce their offspring in February, March and April.

## Feeding Behaviour:

Goats possess physical characteristics and eating behaviours that set them apart from other ruminants. Their narrow mouth and mobile upper lip and tongue all contribute to diet selection of goats. Goats are selective eaters who prefer to browse rather than graze. They will select only the higher quality portions of plants (ie the top leafy portions) leaving behind what they deem to be less desirable. If the forage is too coarse or moldy goats will not consume it. Because goats eat only the most nutritious part of the plant they do not eat down to the ground they tend to be exposed to a lesser worm load on pasture.

A producer should expect a 10-20% daily feed refusal. Feeder design should minimize feed wastage. Adequate feeder space should be allowed so dominant goats cannot crowd out timid goats. Goats will not eat old feed so feeders should be cleaned out regularly. Recommendations for feeder space and height of feeders for dairy goats are:

Hay feeder space (fenceline feeder)

	Length/head mm	(inches)
Does	400	(16)
Replacements/feeders	300	(12)

	Height at throat mm	(inches)
Does and Bucks	450	(18)
Replacements/feeders	350	(14)

If balage is fed all goat may not be able to access it at the same time. If this is the case ensure that the balage is available 24 hours a day and that it is kept fresh. Goats do not like stale and moldy feed!

Goats have a higher dry matter intake (DMI) compared to lactating dairy cattle. Average DMI is 5% of body weight compared to 3% in dairy cattle. A high producing doe will consume up to 7% of its body weight. This results in a faster rumen turnover rate and shorter retention time of ingested feed. There are also differences within breeds. Alpines have a higher DMI compared to that of Nubians. Also, multiparous does have higher DMI compared to primiparous does. DMI generally peaks about 8-12 weeks after kidding. DMI can also be affected by dietary energy and protein level. Higher protein levels will lead to increased DMI while increasing energy levels will decrease DMI.

### **Dry Period:**

The dry period allows the mammary system to regenerate for the next lactation. It also allows the rumen to recover from the higher grain diets. The ideal time to dry off a doe is two months before the doe is due to freshen. To dry the doe off it is best to reduce her production by withholding grain about one week prior to dry-off. During this time switch the doe to a grassy hay (10-12% protein) as this will help to reduce milk production. Feed grassy hay to dry goats in good condition. Does will usually be able to meet their maintenance and pregnancy nutritional requirements on this diet and require only mineral during this period (1-1.5 oz/doe/day). If goats are thin when they are dried off feed additional grain to these does (0.5 – 1 pound). Choose a mineral that contains 12-18% calcium and 6 to 8% phosphorus that also contains trace minerals and vitamins. Strive to achieve a condition score of 3.5 during this period (see appendix 2). Watch to make sure goats do not become too fat or too thin!

Three to four weeks before kidding start feeding the doe grain to get the rumen adjusted to the lactating diet. Does should be started at around ½ pound of grain. This amount should be increased every 3-4 days by ¼ pound until they are consuming 1-¼ to 1-½ pounds a day. Slug feeding of grain should be avoided. Feed grain at least 2x a day.

Avoid feeding legume hay to does in late gestation. Legumes are high in calcium and potassium that can result in does getting milk fever. Ketosis can also occur if goats are underfed prior to kidding. This condition generally occurs in the last 6 weeks of gestation in does with multiple fetuses and in the first 4 weeks in heavy lactating does. Producers need to feed higher energy diets prior to kidding in order to prevent this. Selenium and Vitamin E must also be supplied in adequate levels to prevent white muscle disease in kids.

### **Lactating Does:**

Once a doe freshens, increase the amount of grain as rapidly as possible without pushing the doe. Energy is the limiting factor for milk production. Concentrates should make up 50-60% of the diet. Be careful not to cause digestive upsets! Feeding grain in smaller portions more frequently will help prevent does going off feed. Feeding grain at 0.3 kg/feeding is most desirable. Grain feeding must never exceed 0.7 kg/feeding (1 ½ pounds). Feed the goats grain 2-3x a day. Goats prefer coarsely ground or whole grains

in their ration. Finely ground grains may lead to indigestion. However, with coarse/whole grains, there is more opportunity for selective feeding by does. Molasses can be used to hold rations together and ensure more uniform intake. Lactating does should have 1,000-9,000 IU of vitamin A, 100-500 IU of vitamin D and 15-40 IU of vitamin E per doe. A simple guideline for grain feeding lactating does would be:

Table 2. Guidelines for grain feeding

Days in Milk	Kg grain ration	Kg milk
0 to 100	1 kg for every	2.0 to 2.5
100 to 200	1 kg for every	2.6 to 3.0
200 to 300	1 kg for every	3.5 to 4.0

Forage quality also is very important in determining the amount of protein that needs to be supplemented to goats. Lower protein forages need to be supplemented with higher protein level grain mixes in order to achieve higher milk production. Forage quality is very important for lactating goats. Moldy feed should never be fed to goats. Fermented feeds such as corn silage and balage must be fed very carefully to goats. Spoiled corn silage can cause *Listeria* or “circling disease” in goats. Fermented feeds would be more suited for larger farms to ensure that enough is being fed to prevent feed from spoiling.

Table 3. Guidelines for dairy goat ration selection

% Protein in the roughage	% Protein in Dairy Goat Ration for:	
	High Production	Low Production
15 % and over	14%	12%
12 to 15%	16%	14%
10 to 12%	18%	16%
Less than 10%	20%	18%

In practical dairy feeding a 16% ration is most widely used for lactating goats and hay less than 12% protein is generally not recommended.

As with lactating cattle, goats in early lactation can't consume enough energy and must use body fat reserves for milk production. It will take from 6-10 weeks for a goat to achieve maximum dry matter intake. As a result does will lose body condition early in their lactation. Goats will gain body reserves later in lactation when milk production is lower and DMI is higher.

Many different ingredients and additives can be used for lactating goats to improve milk production. Having fat at 5% of the diet can increase milk fat %. Adding sodium bicarbonate will also increase butterfat and can be fed at a rate of 5g for every 1 kg of milk production. The addition of yeast has been shown to increase milk production by as much as 11%. Urea can also be used as a non-protein nitrogen source but is very unpalatable.

## **TMRs for Lactating Goats:**

Larger and more sophisticated operations are now feeding goats using a TMR (total mixed ration) system. This allows the grain to be mixed in with the forages decreasing the potential for digestive upsets (i.e. decrease “slug” feeding of grain) and increasing milk production. As with dairy cattle, TMRs must be managed properly in order to get maximal production. Goats have a tremendous ability to pick and sort what they want to eat. Goats will sort out such ingredients as cob wheels from corn silage and grain within the TMR mix potentially causing digestive upsets and acidosis. Flavours are also an issue with goats. Off flavoured feeds will lead to a depression in DMI. Forage quality is important. Poorly fermented haylage and corn silage will lead to health problems (i.e. listeria) and ultimately poorer production. Good quality feed must be available to goats at all time. Ensure that enough fermented forages are being fed to prevent the feed surface from spoiling (especially in the summer).

The same concepts apply to goats as those of dairy cattle being fed by TMR. Proper feed bunk management is critical! Watch to make sure that feed is kept cool and is not heating. This is a sign of spoilage. Make sure goats have access to the TMR all the time. Push up feed to the goats to make sure it is available. Clean up any old and moldy feed from the manger prior to feeding a new batch of feed to promote feed intake. Putting new feed on top of old feed will reduce DMI. Never over mix the TMR! Over mixing the TMR will result in reduced particle size and increase the chance of acidosis. A TMR should never be mixed for more than 4-5 minutes. Hay can also be fed to ensure proper rumen function and fiber. A goat will require a 15-16% protein ration from a TMR mix. In general, no more than 50% grain mix should be added to a TMR (DM basis). This will help reduce the incidence of digestive upsets in does.

Ideally forages should be analyzed for nutrient content (i.e. protein) to give a better idea on what level of grain and protein needs to be fed. Forages lower in protein (corn silage) will need to be supplemented with additional protein in order to maximize production. Excellent quality forages (good haylage) will require less protein being fed. Overfeeding will result in higher feed costs for the producer.

## **Targeted Body Condition for does during lactation**

As with lactating cows, having goats in a proper body condition will lead to higher producing and healthier does. Goats that are too fat at kidding will result in more health problems. Goats that are too thin in early lactation will not have the energy reserves required to attain high milk production. Thin goats at breeding will also be harder to get pregnant. Targets body condition scores for goats are:

<u>Time Period</u>	<u>BCS</u>
At freshening	3.5
45 days into lactation	3.0
90 days into lactation	2.5
At breeding	3.0 to 3.5
At drying off	3.5

(Description in appendix 2)

### **Water:**

Goats must have ad libitum access to clean, fresh water at all times. Goats will refuse contaminated water until forced to by thirst to drink. A mature doe will consume about 3.5 l of water for every liter of milk produced. Lactating does should have 0.1 square meters/20 head of water space. All other goats should have 0.1 square meters/40 head. Water should be available right after milking. Goats drink from 30 to 50% of their total dairy water intake within the first hour after milking.

### **Health Problems in Dairy Goats:**

As with lactating dairy cattle there are health problems associated with improperly feeding lactating goats. Through proper feeding and management most can be minimized. Some of these include:

**Udder Edema:** It is most commonly observed in high producing goats during the late dry period and after parturition. It is characterized by the swelling of the udder. Limiting the amount of sodium (salt) and potassium (alfalfa hay) will help. The total ration dry matter should contain 0.2 - 0.3% sodium and 0.7% potassium.

**Milk Fever:** It is generally seen in high producing goats 1 to 3 weeks prior to and after kidding. Feeding a diet prior to kidding with a Ca:P ratio greater than 1.5 to 1 will help reduce the incidence of milk fever. Do not feed legume hay.

**Lactic Acidosis:** Clinical symptoms of acidosis include goats going off feed, variable appetite, depressed milk fat and chronic laminitis. The best prevention is to feed forages prior to feeding grain and feed grain 3x a day. Step grain up gradually will also reduce the incidence of acidosis. Feeding rolled or whole grain instead of finely ground grain will also reduce the incidence of acidosis. Using slow degrading grains such as corn instead of fast degrading grains (ie wheat and barley) can also help reduce the incidence of acidosis.

**Enterotoxemia:** It is caused by a sudden change in feed or overeating by very hungry animals. Some clostridial bacteria undergo rapid growth and release toxins in the intestinal tract. Adult animals may show depression, intoxication and incoordination. Mortality rate is high with enterotoxemia. Regular feeding and vaccinating against the *Clostridium perfringens* bacteria will help prevent the disease.



**Listeria (Circling Disease):** Circling disease is caused by the bacteria *Listeria monocytogenes*. Symptoms include depression, decreased appetite, fever, leaning or stumbling and facial paralysis on one side. The head is pulled to the flank with a rigid neck. Causes include sudden changes of the type of feed being fed and feeding moldy and spoiled fermented feeds.

**Foot Rot:** Housing goats in a clean, dry environment best prevent foot rot. The bacteria that cause foot rot thrives in wet muddy areas. Treat by carefully trimming away the rotten area and treating the infected area with 10 to 30% copper sulfate solution as prescribed by a veterinarian. Antibiotics can also be used to treat foot rot under the guidance of a veterinarian.

### **Housing Dairy Goats:**

Housing dairy goats does not have to be elaborate, but must be clean, dry and comfortable for the goat. Good housing of goats should include:

- The building should be adequately ventilated but not drafty
- The walls should be free from condensation
- The bedded area should be relatively dry and clean
- The hay, grain and water troughs must be well built and located so that feed or water is not wasted or contaminated
- Housing should be arranged to minimize labour requirements

The comfort zone for dairy goats is between 12 and 21 °C. Milk production and feed intake are generally not affected with lower temperatures but temperatures over 27 °C will result in reduced feed intake and milk production.

The movement of air, either to remove heat, moisture or odours, is essential. Most pneumonia problems with dairy goats are associated with inadequate ventilation. Wet walls and ceilings are signs of improper ventilation, poor insulation or a combination of both.

### **Shelter Requirements of Goats**

<u>Animal:</u>	<u>Square meters</u>	<u>Square feet</u>
Kid (hand fed)	0.3-0.5	3-5
Feeder goats	0.6	6
Doe with 1-3 kids	1.2-2.5	12-25
Dry doe	1.0	10
Pregnant doe	1.5	15
Buck	2.5-4.0	25-40

## **Feeding and Managing the Buck:**

When bucks are not being used, good quality pasture or mixed hay alone will be enough to keep bucks in good health. Provide salt and mineral for the buck. Bucks only need a 12-14% protein diet. Two to four weeks prior to breeding season feed 1/2-1 pound of grain mix 2x a day (1-2 lbs a day). The same grain mix used for lactating goats can be used for bucks. The same problems that can happen in sheep can also occur to bucks if they are not fed properly. Urinary calculi can occur! Ensure a Ca:P ratio of 2:1 to reduce the incidence of urinary calculi. A urine acidifier can also be added. The buck should have access to clean, fresh water all the time.

Watch to make sure that bucks are not over conditioned. During the breeding season the buck will lose some condition so grain will need to be fed afterwards to gain condition back on him. Adjust grain up or down according to the condition of the buck. Four to six weeks before the breeding season check and trim feet and treat any foot rot if necessary.

## Shur-Gain Lactating Goat Programs:

### Shur-Gain Dairy Goat Complete Feeds (pellets)

The pelleted rations are best suited to feeding situations where selective feeding is a problem. Feeding these rations ensures that all animals get the ration as formulated.

97167 Shur-Gain 14% Dairy Goat Ration (0% ECP)

97172 Shur-Gain 16% Dairy Goat Ration (0% ECP)

97177 Shur-Gain 18% Dairy Goat Ration (0% ECP)

97182 Shur-Gain 20% Dairy Goat Ration (0% ECP)

### Shur-Gain Dairy Goat Supplements (pellets)

The Shur-Gain dairy goat supplements offer a variety of options for producers. There are a number of different ways that they can be mixed up to make a textured ration. In addition, the supplement can be top dressed to meet requirements. These are best suited to those feeding situations where selective feeding is not a major concern or where producers want to maximize the use of home grown grains.

#### 97157 Shur-Gain 30% Dairy Goat Supplement 200 (0% ECP)

The Shur-Gain 30% Dairy Goat Supplement 200 (0% ECP) along with grains, soybean meal, molasses and roasted soybeans will make a 16%, 18% and 20% Dairy Goat Rations (0%ECP) (TR).

	<u>16% Dairy Goat Ration</u>	<u>18% Dairy Goat Ration</u>	<u>20% Dairy Goat Ration</u>
30% Dairy Goat Supp	200	200	200
Corn	400	305	280
Barley	250	305	275
Roasted Beans	100	100	105
Soybean Meal	---	40	90
Molasses	50	50	50
TOTAL	1000 kg	1000 kg	1000 kg

97162 Shur-Gain 35% Dairy Goat Supplement 250 (0% ECP)

The Shur-Gain 35% Dairy Goat Supplement 250 (0% ECP) along with grains, soybean meal, tallow and molasses will make a 16%, 18% and 20% Dairy Goat Rations (0% ECP) (TR).

	16% Goat Goat Ration	18% Goat Goat Ration	20% Goat Goat Ration
35% Dairy Goat Supp	250	250	250
Corn	345	320	292
Barley	345	315	291
Tallow	15	15	16
Soybean Meal	---	55	106
Molasses	45	45	45
<b>TOTAL</b>	<b>1000 kg</b>	<b>1000 kg</b>	<b>1000 kg</b>

**Shur-Gain Feeding Products for Lactating Dairy Goats:**

	14% Dairy Goat ration	16% Dairy Goat ration	18% Dairy Goat ration	20% Dairy Goat ration	30% Dairy Goat sup	35% Dairy Goat sup
Crude Protein (%)	14	16	18	20	30	35
Crude Fat (min. %)	4.5	4.5	4.5	4.5	5.0	5.0
ADF (%) max.	12	12	12	12	8	8
Calcium (%)	0.8	0.8	0.8	0.8	4.0	3.2
Phosphorus (%)	0.60	0.60	0.60	0.60	1.75	1.5
Sodium (%)	0.4	0.4	0.4	0.4	2.0	1.6
Magnesium (%)	0.3	0.3	0.3	0.3	1.0	0.8
Potassium (%)	1.0	1.0	1.0	1.0	1.0	0.8
Sulphur (%)	0.2	0.2	0.2	0.2	0.3	0.3
Copper (mg/kg)	40	40	40	40	200	160
Manganese (mg/kg)	100	100	100	100	500	400
Zinc (mg/kg)	160	160	160	160	800	600
Iodine (mg/kg)	3	3	3	3	15	12
Cobalt (mg/kg)	1	1	1	1	5	4
Vitamin A (IU/kg)	16,000	16,000	16,000	16,000	80,000	64,000
Vitamin D (IU/kg)	3,000	3,000	3,000	3,000	15,000	12,000
Vitamin E (IU/kg)	50	50	50	50	250	200
Added Selenium (mg/kg)	0.3	0.3	0.3	0.3	1.5	1.2

## Appendix 1.

### Nutrient requirements of goats

Milk Yield	Body Wt. (lb)	Crude Protein (lb)	TDN (lb)	Ca (g)	P (g)
2.5	130	0.42	3.0	9	6
	160	0.46	3.2	10	7
5.0	130	0.62	3.6	13	9
	160	0.68	3.9	14	10
10	130	0.96	5.6	20	14
	160	1.06	5.8	22	16
15	130	1.34	7.2	27	19
	160	1.38	7.6	29	20
20	130	1.7	9.0	34	24
	160	1.74	9.4	36	26

## Appendix 2. Body Condition Scoring of Lactating Goats

Score 1: Body condition is poor. There is no fat over loin, rump and short ribs. The bones stand out and are visible. There is a deep cavity around the tail head. There is no tissue over the pelvis.

Score 2: Still no fat around the tail but the cavity is not as prominent. You can feel the short ribs but they cannot be seen as clearly.

Score 3: Area around tail, pins and rump have covering of fat. But the bones can still be felt with slight pressure. Hooks, pin and backbones are not as angular.

Score 4: Animal is slightly fat. No depression between pins and tail head. Pelvis is covered with fat and felt only with pressure.

Score 5: Animal is grossly fat. Rump area is rounded. Pelvis can't be felt even with pressure. No depression in loin area. Body is covered with fat.