
Dairy goat in Sindh-Pakistan

By Mrs. Farzana, May 2005

Author: Farzana Panhwar (Mrs)

Address: 157-C, Unit No.2, Latifabad, Hyderabad
(Sindh), Pakistan

E-mail: farzanapanhwar@hotmail.com
farzanapanhwar@yahoo.com

Fax: 92-21-5830826 and 92-221-860410

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Abstract

The proper nutrition, combine with balance ingredients in diet, according to the stages of goat life are the major contributing factors that effects directly on the quality and quantity of milk production in goats. While other factors although they also play a role in milk quality and quantity production are environmental pollution, goat health, un-hygienic conditions, un-safe drinking water, over population of goat herds in an small area, are less important.

The goat milk contains small fat globules as compared with cow or buffalo milk. These globules helps in lowering the curd, which results into that goat milk becoming easily digestible as compared to cow milk.

It is also found that duodenal ulcer, digestive upsets and asthma patients have easy way to digest goat milk as compared to cow milk. Since the beef protein which is present in the cow milk is the major contributing factor of eczema, asthma and allergies in children. This protein is absent in the goat milk, which reduces the allergy reaction in children.

Introduction.

In the year 1996 the total goat population in Pakistan was 41166,000 heads, while in Sindh it was 9734,000 heads.

In the year 1999-00 total goat population in the country was 47426,000 heads, while the male population, one year and above was 6010,000 heads, the female one year and above was 25755,000 heads and young stock less than one year was 15661,000 heads.

In the year 1999-00, in Pakistan the gross production for milk from goat was 31,804,000 tonnes, while goat milk consumption was 25,566,000 tonnes.

In the year 1999-00 in Pakistan the goat meat production was 218,000 tonnes/million, goat skin production was 23.3 million No., goat hair production was 18,000 tonnes.

In the year 1999-00 in Pakistan the total fodder production was 2,64,900 hectares out of which in Sindh was 365,700 hectares. The total fodder production in Pakistan was 22.7 per hectare in tonnes, out of which in Sindh, fodder crop production was 25.0 per hectares in tonnes.

General

If goat becomes undernourished during pregnancy this not only effect on the milk quality but also effects on the duration of lactation. If goat is healthy having good body reserves brings high level of lactation. Following are suggested supplement (g/head/day) during pregnancy and lactation are as under:

Life time	Feed, oat used in Sindh	Feed, lupin used in USA
Pregnancy 0-100 days.	300 gm/head/day	200 gm/head/day
Lactation time.	600 gm/head/day	400 gm/head/day

Although in Sindh the various fodder crops are available like; lucerne, berseen, wheat, grams, oat, methra, turnip, raya, jawar, cow peas, maize, marsh, and grasses, are used, but since most of the farmer are illiterate, they do not know the quantity, availability, and supplemental diet, as a result they get less than average amount of milk having poor quality.

Following ingredients should be added in the diet during early lactation period, to get better quality and quantity of milk forages: like-grass, silage, straw, hay, maize silage, concentrates like: proprietary concentrates (excluding minerals/vitamin supplements), soybean meal, barley, mixed cereals, dried grass, lucerne and by products and processed feeds like, sugarcane molasses, dried sugar beet pulp moist sugar beat pulp and fat supplements.

By using complete diet the goat also show less incidence of health disorders like: Ketosis, milk fever, off-feed reproductive problems, retained placenta, displaced abomasum and fat cow syndrome.

Feeding habit.

In Sindh most farmers do feeding twice a day, which mostly contains fresh hay, fresh green grasses, dry hay and small quantity of dry protein. The average milk production is 250-300 gm/day, while lactation lasts for only 2-3 months.

The following table show the energy and protein and its effect on the fat percentage in the goat milk supplied by diet.

Goat milk analysis.

S.No.	Amount of Energy			Protein as a digestible crude protein (grams)	Fat percentage in milk (%)
	Starch equivalent (grams)	Total digestible nutrients (grams)	Metabolisable energy (Mj)		
1.	243	280	4.17	45	3.0
2.	287	330	4.91	51	4.0
3.	330	380	5.66	56	5.0
4.	374	430	6.40	60	6.0

Milk yield is usually recorded in morning and evening hours. During milking fat percentage changes from 1-10%. Incomplete milking show lower fat content and milk yield. The chart below show that for more live weight, the goat need more dry feed intake.

The weight of the goat depending both on body condition and the quality and quantity of feed. Live weight (kg)	Intake of dry feed (kg/day) Exceptions are late-cut lucerne hay, barley-sraw and similar feeds eaten in small amounts	
	Bucks and dry does	Lactating does
30	1.0 - 1.3	1.5 - 2.0
40	1.3 - 1.6	1.9 - 2.5
50	1.5 - 1.9	2.3 - 3.0
60	1.7 - 2.2	2.6 - 3.4
70	1.9 - 2.4	2.9 - 3.9

It is also observed that if goat is fed processed roughage like alfalfa, corn and sorghum the intake of goat feed per day is reduced, but its milk production is increased and milk will have less percentage of fat in it.

Minerals in goat milk.

If young goat is fed a diet too rich in digestive protein, it will result in to mineral deficiency diseases.

The major elements contained in milk ash are calcium, phosphorus, magnesium, potassium, sodium, chlorine and sulphur. The content of each element is largely determined by genetic factors, nutrition and other environmental factors.

Content of calcium, phosphorus, magnesium and sodium in the main mineral supplements diet of goat.

Mineral supplement	Ca (%)	P (%)	Mg (%)	Na (%)
Steamed bone.	38.5	13.5	0.35	0.47
Dicalcium phosphate.	23.6	17.9	-	-
Monosodium phosphate.	-	17.0	-	25.7
Ground limestone.	38.0	-	-	-
Common salt.	-	-	-	39.0
Calcined magnetise.	-	-	52.0	-

Mineral content in goat milk and the requirements for lactation.

Mineral	Content in 5 kg of goat milk	Daily requirements for 60 kg doe, yielding 5 kg/day milk*	Minimum level/day*
Calcium (g)	6.9	13.0 - 25.5	10.0
Phosphorus (g)	5.2	9.1 - 11.5	6.5
Magnesium (g)	1.2	4.5	0.2
Sodium (g)	1.9	3.5	0.03 ⁺⁺
Potassium (g)	9.8	15.0	-
Chlorine (g)	9.1	12 g NaCl	-
Iron (mg)	2.0	15.0 ⁺	0.003 ⁺⁺
Copper (mg)	2.0	7.0 ⁺	0.0007 ⁺⁺
Molybdenum (mg)	0.06	0.2 ⁺	0.00002 ⁺⁺
Manganese (mg)	0.4	45.0 ⁺	0.00006 ⁺⁺
Iodine (mg)	0.9	0.15 ⁺	-
Cobalt (mg)	-	0.07 ⁺	-
Selenium (mg)	-	0.1 ⁺	-
Nickel (mg)	-	0.1 ⁺	-

* mg/kg matter.

++ % of dry matter.

* N.R.C 1981. Nutrient requirements of goats.

Amount of B-vitamins in goat milk are shown in table below.

Thiamine.	0.7 mg/kg
Riboflavin.	5.0 mg/kg
Panthenic acid.	3.5 mg/kg
Nicotinic acid.	5.0 mg/kg
Vitamin B12	0.003 mg/kg
Vitamin B6 Folic acid Biotin Choline	Values are Not available

Just after kidding, most goat can produce atleast 4.5 litres of milk per day. It is observed that many well-bred goats, if left un-mated can continue economical milking for two years.

Comparison of various age group on lactation days, milk yield and butter fat production.

Age	Average length lactation	Average milk production per doe	Average butter fat production per doe
One year old	280 days	761 litres	28 kgs
Two years old	265 days	928 litres	33 kgs
Three year old	264 days	889 litres	32 kgs
Four year old	281 days	924 litres	33 kgs
Mature	279 days	823 litres	30 kgs

It is observed that in the 2nd year doe average milk production is the highest with good amount of fat in it.

Estimates of the energy value of milk can be used to allow for variations in milk composition. Because fat is the main source of energy in milk, it is usual to express production of milk as fat-corrected-milk (FCM) with a standard 4% fat using the formula of Overman and Gaines (1948).

$$\text{FCM (kg)} = 0.4 \text{ milk (kg)} + 15 \text{ butterfat (kg)}$$

Slightly more reliable estimates of the energy content of milk ($Y = \text{kJ/kg}$) are obtained by including the SNF Solids-not-Fat fraction using the equation of Tyrrell and Reid (1965) -

$$Y = 386 \text{ BF} + 205 \text{ SNF} - 236$$

where BF (Butter fat) and SNF are fat and solids-not-fat percentages (w/w).

The fat and solids-not fat contents of milk, show low level at the beginning 6-10 weeks then increase until the end of lactation. It is observed that protein and casein amount in the feed if reduced will directly affect low solids-not-fat percentage in milk although the feeding level do not show any effect on lactose level in the milk. High grain and pelleted diet in the feed show very low butter fat percentage. If goat milk yield reduced due to low energy intake, it increases the level of butter fat in milk. This also represent the low casein-to-fat and protein-to-fat ratios.

Comparison of milk of various species.**Comparative composition of the milk of various species.**

Species	Water (%)	Fat (%)	Sugar (%)	Casein (%)	Other proteins (%)	Ash (%)	Lactose (%)	Minerals (%)
Goat	86.2	4.5	4.08	2.47	0.43	0.79	4	1
Cow	87.3	3.67	4.78	2.86	0.56	0.73	4	1
Sheep	79.46	8.63	4.28	5.23	1.45	0.97		
Mate	89.8	1.17	6.89	1.27	0.75	0.30		
Donkey	8.88	1.5	6.09	0.73	1.31	0.49		
Dog	75.44	9.57	3.09	6.10	5.05	0.73		
Cat	81.63	4.49	4.79	3.72	3.3	0.58		
Pig	83.23	4.5	4.2	7.3		0.77		
Woman	87.4	3.0	6.5	0.04	0.7	0.25		

Although there is only a slight difference in fat percentage between goat and cow milk but the major difference is in the digestibility, which is more in goat milk than cow milk.

The main Fatty acids found in ruminant fat products.

Fatty acids			Proportions in butterfat (%)	Melting point (°C)
Saturated and un-saturated	Carbon No.	Chemical name		
Saturated fatty acids.	C4	Butyric	4	-8
	C6	Caproic	3	-3
	C8	Caprylic	2	16
	C10	Capric	4	31
	C12	Lauric	5	44
	C14	Myristic	12	54
	C16	Palmitic	26	63
	C18	Stearic	9	70
	C20	Arachidic	0	76
Unsaturated fatty acids	C18:1	Oleic	25	13
	C18:2	Linoleic	3	-5
	C18:3	Linolenic	0.3	-15
	C20:3	Arachidonic	0	-50
	Others		6.7	n.a.

Note: The standard code C20:3 signifies that the fatty acid chain has twenty carbon-carbon bonds, three of which are unsaturated.

The above chart explain that Palmitic-saturated fatty acid and Oleic-unsaturated fatty acid are the major butter fat present in ruminant fat products.

Component fatty acids of animal depot fats.

Fatty acids, % of total carbons in various milks and meats										
Animal	12:0	14:0	16:0	18:0	20:0	16:1	18:1	18:2	18:3	20:1
Cow	-	6.3	27.3	14.1	-	-	49.6	2.5	-	-
Pig	-	1.8	21.8	8.9	0.8	4.2	53.4	6.6	0.8	0.8
Sheep	-	4.6	24.6	30.5	-	-	36.0	4.3	-	-
Goat	3.5	2.1	25.5	28.1	2.4	-	38.4	-	-	-
Horse	0.4	4.5	25.9	4.7	0.2	6.8	33.7	5.2	16.3	2.3
Chicken	1.9	2.5	36.0	2.4	-	8.2	48.2	0.8	-	-
Turkey	0.1	0.8	20.0	6.4	1.3	6.2	38.4	23.7	1.6	-

The component fatty acids of some milk fats in mole percentage.

Fatty Acid	Cow	Goat	Sheep
4:0	9.5	7.5	7.5
6:0	4.1	4.7	5.3
8:0	0.8	4.3	3.5
10:0	3.2	12.8	6.4
Total short chain	17.6	29.3	22.7
12:0	2.9	6.6	4.5
14:0	11.5	11.8	9.9
16:0	26.7	24.1	21.6
18:0	7.6	4.7	10.3
20:0	1.8	0.4	0.8
10-12 unsaturated	1.1	1.4	1.0
16:1	4.3	2.2	2.0
18:1	22.4	16.5	21.5
18:2	3.1	2.8	4.3
20-22 unsaturated	1.0	0.2	1.3

Source: Hilditch and Williams (1964).

The above chart explain the goat contains highest amount of 12:0 compared with cow and sheep fatty acid and goat milk contain highest amount of 8:0, 10:0 fatty acids and highest short chain fatty acid 12:0, 14:0 and 10-12 unsaturated fat in the milk.

Fat in goat milk.

the fat in the goat milk depends upon the composition of dietary fat. It means the quality and quantity of fats can be regulated in goat by altering the nutrition, which helps in the production of right fatty acids, light or hard fat like poly-unsaturated cheese. The right fatty acids in the feed help the mammary gland to synthesise butter fat. About half of milk fat derived from the fat and oil's present in the diet, while remaining half are derived from the intermediate metabolites, especially acetic acid, which is derived by the fermentation of cellulose present in the reticule-rumen with the help of micro-organisms. Moderate amount of fat in the diet is controlled by rumen bacteria.

If feed contains high amount of fibre, the fat coats the outside surface of digestive system and as a result the micro-organism and bacteria have digest to perform it and fibre digestibility is reduced. But the more fat and oil in the diet, converts into protected lipid. These can not be degraded in the reticule-rumen, and pass straight into abomasum, where they are utilised in the normal way, so they do not interfere with fibre digestion. This means that higher level of dietary fat can be fed successfully. They are protected from saturation by rumen bacteria. This way the amount of fat in the milk accurately shows the composition of dietary fat.

Dairy goat cross breeding.

In order to get better breed for dairy, farmers try various cross breeds. Cross-breeding of Beetal, Alpine, Sannen and Malabari and its effects of lactation yield (kg) and lactation length (day) is shown in table below.

Breed/Cross	Lactation yield (kgs)	Lactation length (days)
Beetal	156.9	186
Alpine	308.4	245
Saenen	286.4	243
Malabari	65.3	173
Alpine x Malabari	98.0 (50.1%)	187 (8.1%)
Saenen x Malabari	127.3 (94.9%)	191 (10.4%)
Alpine x Beetal	257.1 (63.9%)	223 (19.9%)
Saenen x Beetal	309.6 (97.3%)	241 (29.6%)

The figures within brackets are the percentage of improvement.

The comparative statement shows that cross breed between Saenen and Beetal shows highest lactation yield and better lactation period and this practice has 97.3% chances of improvement.

Milk quality.

Sometimes goat milk quality decays due to presence of silage, Brassica species, legumes like, *Leucaenaleucocephala*, Lablab pursuers in the feed but this effect can be controlled if their intake is for 3-4 hours before milking reduced.

Milk flavour.

Milk flavour can be affected by abortion, mastitis and retained placenta or by faulty fat metabolism process, due to slight anaemia, acetonemia, or diabetes in goat.

Keeping quality of goat milk.

Goat milk can be kept for 9 days at 1-3°C without affecting its quality. Although the quantity of goat milk fluctuates with season.

Un-pasteurised goat milk (from Amendments to Food and Drug Regulations, 1977) must have a standard plate count not exceeding 150,000 micro-organisms per cubic millilitre and must be free from coliform organisms in 0.1mL.

Pasteurised milk must have a standard plate count not exceeding 50,000 micro-organisms per millilitre and must be free from coliform organisms in 1.0 mL when tested by the methods described in Standards Association of Australia using incubation temperatures of 30°C. Also, pasteurised goat milk must give a reading not greater than 10 micrograms of p-nitrophenol per millilitre using the phosphate test. Goat milk normally contains fats between 3.3-5%.

Conclusion.

An average dairy goat gives 2.3 litres milk per day and lactation period last for 7-10 months. The milk level depends upon the breed and good feeding. Milk production directly related with the energy supplied in the diet and extent to which draw upon body reserves. The short chain fatty acids in butter fat are synthesised by the mammary gland from the short chain fatty acids absorbed directly from the rumen, where the long chain acids, especially oleic (C18.1) are derived from catabolism of body reserves. The proportion of these fatty acid in butterfat provide a means of estimating the relative contribution of each source of energy to butter fat synthesis.

It means that to get a good quality and quantity of goat milk, we have to get better cross breed, showing better milk results we also have to properly select the ingredient in the feed. Which helps us to control the quality and quantity of goat milk.

Results.

If we consider these factors, we can boost the economy of dairy goat production and earn better returns.

References.

- Wilson, P.N., and Brigstocke, T.D.A., (1981). Improved feeding of cattle and sheep, Granda Publishing Co., 238 p.
- Owen, J.B., (1979). Complete diets for cattle and sheep, Farming Press Ltd, 159 p.
- Mackenzie, D., (1980). Goat husbandry, Faber and Faber, 375 p.
- Carles, A.B., (1987). Sheep production in the Tropics, Printed by Indraparastha Press (CBT), New Delhi, 213 p.
- Proceedings of the International Seminar on recent improvements in goat production in Asia, 8-11 May 1984, Pcarrrd, Los Banos, Laguuna, and the Philippines, Goat production in Asia, 186 p.
- Sen, K.C., (1978). Nutritive values of Indian cattle feeds and the feeding of animals, Indian Council of Agricultural Research, New Delhi, 92 p.
- DeMan, J.M., (1980). Principles of food chemistry, The AVI Publishing Co. Inc., USA, 422 p.

- Ternouth, J.H., (1983). Dairy cattle research techniques, Queensland Department of Primary Industries, Australia, 364 p.
- Singh, Lal Bahadur, and Bhattacharyya, Nirmal Kant, (1985). Central Institute for Research on goat Makdoom, P.O. Farah Mathura, India.
- Buffalo and Cattle Development in Punjab (A technical docuent), Pakistan-German Technical Co-operation, Deutsche Gesellschaft fur Technische-Zusammenarbeit (GTZ), GmbH - May, 1997, 126 p.
- Church, D.C., (1986). Livestock feeds and feeding, second edition, Prentice - Hall, USA, 549 p.
- Evans, M., (1985). Nutrient composition of feed stuffs for pigs and poultry, Queensland Department of Primary Industries, Australia, 134 p.
- Cheema, Amanullah, and Muller, Z.O., (1983). Protein nutrition of Ruminants, Pakistan Agricultural Research Council, 79 p.
- Brown, H.H., (1981). The dairy goat in Queensland, Queensland Department of Primary Industries, 93 p.
- Seymour, M., (1996). Boost milk production for early prime lamb, Agriculture Farmnote No.99/96, Western Australia Agriculture.

Author: Farzana Panhwar (Mrs)
Address: 157-C, Unit No.2, Latifabad, Hyderabad (Sindh), Pakistan.
E-mail: farzanapanhwar@hotmail.com
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