

NUTRITION SPECIFICITIES OF GOAT KIDS IN SUCKLING PERIOD

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Abstract

In this paper the up to date methods and regulation of goat kids feeding as the new normatives and nutrient requirements are presented. In kids feeding remarkable attention has to be made on optimal needs concerning the accurate growth and progress. In order to make the best solution the updated normatives with large number of parameters have to be used.

Growing goat kids require energy, protein, vitamins and minerals for optimum growth. Determining quantities of these nutrients needed will make possible to determine how much of grain mix and hay should be used to support maintenance and growth. The nutrient requirements of growing goats show a different trend than those of mature animals.

The latest investigation results on protein level recommendation in kids feeding (NRC, 2007) have grown over 45%, while energy needs only infinitesimally more in regard to goat nutrient requirement needs considering the NRC recommendation from 1981. However, it must be remembered that energy requirements are based on minimal activity needed to secure feed and the actual requirement may vary. Thus, the needs of energy for growing kids with a body mass of 20 kg is 5.69 MJ ME and 75.6 g in proteins. The first three days after birth are the most critical days in the life of a newborn kid. If the mother rejects the kids, colostrum of kids should be fed three times a day, a total of 2 to 3 pint per day. After three days, the kid diet is based on milk or milk replacer, which is given twice a day and does not exceed three liters per day. Feeding with milk or milk replacer may continue until 8-12 weeks or until the time the kids are weaned and able to consume 0.2 kg grain milk per day.

At weaning, for feeding the 30 days old kids we used a mixture concentrate for early suckling kids. By own nutrient compounds this grain mixtures must have better quality than concentrate mixtures used in goat kids feeding.

Provide a grain mix (kid starter) containing high levels of protein (16%) and high levels of fiber (11%) as well as good quality hay to encourage rumen development. After weaning up to 6 months, continue feeding with kid starter 0.2 to 0.4 kg/day and plenty of good quality forage and pasture. When the growing kids start to use large amounts of hay or green forage in feeding, they should be given a mixture of concentrate with something simpler composition. Do not feed silage and non-protein nitrogen at this age.

Key words: *goats, kids, nutrient requirements, nutrition, weaning*

Introduction

Adequate nutrition and rearing of kids is the basis for future high production in goats. The production values of each head is greatly dependent on feeding in early age (Memiši and Bauman, 2003; Žujović et al., 2002). Future goat production will therefore depend largely on the quantity and quality of these nutrients. In doing so, the quality of roughages is of great importance (Poore and Luginbühl, 2002). In such cases, depending on quality of roughage a part of it involves a certain amount of concentrate feed, because the forage crops are not sufficient to meet all the needs of animals in nutrients. Concentrate mixtures are given to the younger categories with the aim to increase the share of energy and protein in the diet and also to enrich meal in certain mineral elements (Memiši et al., 2007a and 2008a). Special attention should be given to feeding goats in gestation period. In regard to this, a good diet in the last gestation period resulted in coarser and more vital kids, which later enabled their intense and successful development (Memiši et al., 2008b).

Intensive production of kid meat in countries with developed goat production is becoming more and more prominent (Memiši, 2009). In addition, of particular interest are systems that contribute to solving the problem of efficient kids weaning, in other words, a faster transition to feeding with dry food (Memiši and Bauman, 2007b). Taking into account that in our country there is a great interest in breeding goats, and the problem of rearing the kids is still greatly unknown, we wanted, in this paper, to give a contribution to clarifying the issues related to the effects of proper weaning of the kids. One more reason is that there are real possibilities to adequately rear offspring in our conditions with great success, which will allow breeders to produce larger quantities of milk for the production of various products for the market and it will also lead to the intensification of goat production, which currently is not on a high level.

Nutritional requirements of goat kids

It is most important for kids to receive colostrum (the doe's first milk) during the first 24 hours of their life. A healthy newborn kid rarely needs help to suck from its dam. Colostrum contains essential antibodies (immunoglobulins) that protect kids from disease and represents a concentrated source of nutrients. The newborn kid can absorb the essential antibodies in colostrum only during its first 24 hours or so of life. Kids eat solid food from about 1 week of age and are often seen ruminating at about 2 weeks, so it is important to give them good-quality hay and suitable concentrate from 1–2 weeks of age (Ensminger, 2002).

When the young goats begin to eat solid food (forages and grains), these feeds may stay in the rumen what can lead to development of the microbial population. The rumen-reticulum and the large intestine begin to increase more rapidly at the expense of the abomasum and small intestine. The change from preruminant to ruminant is a gradual process. Fibrous feedstuffs (forages) encourage rumen development and appear to speed up the development of the muscles of the rumen wall (Ezeasor and Nwaogu, 2008), which are important in rumen digestion and mixing of rumen contents.

These changes in the digestive system have a large impact on the feeding methods used in raising young goats and should be kept in mind during all feeding management decisions. Growing goat kids require energy, protein, vitamins and minerals for optimum growth and profitability. Determining needed quantities of these nutrients will

enable you to determine how much of grain mix and hay should be used to support maintenance and growth (Memiši and Bauman, 2007b).

Growth is a period of high energy requirement and the NRC (1981) recommends an allowance of 1732.8 kJ ME/kg of weight gain be made in the diet. The difficulty in estimating energy requirements for growth are due to the immense differences in the energy costs of protein and fat deposition and the change in rates of deposition with age, weight and diet (AFRC 1997). Growth has high protein requirements due to the fast lay down of protein rich tissue. The NRC (1981) recommendation of protein allowance for growth was 195g DP/w kg 0.75. For replacement females in a dairy system the female weaners need to gain 50-100g/day. In order to achieve this, the diet should contain 12 MJ/kg DM and 140g CP/ kg DM (AFRC 1993). To achieve growth rates of 200g/day, the diet needs to be based on cereal grains and in an intensive lotfeeding type situation (AFRC 1993). The metabolisable protein requirements for growth as recommended by the AFRC (1997) are detailed in Table 1.

Table 1. *Requirements in metabolisable protein for the growth of kids (AFRC 1997).*

Expected growth	Requirements in metabolisable protein (g/day)		
	The body weight of kids		
	15 -20 kg	20-25 kg	25-30 kg
100 g/day	24.6	24.0	23.4
200 g/day	49.2	48.0	46.8
300 g/day	73.8	72.0	70.2

The nutrient requirements of growing goats show a different trend than those of mature animals (Table 2). In the research of group of authors (Luo et al., 2004 and 2004a; Sahl et al., 2004), recommendations for the level of protein in the diet of goats, according to these studies, increased by over 45% while the needs of the energy were only slightly higher compared to those of 1981 (NRC, 1981). However, it must be remembered that energy requirements are based on minimal activity needed to secure feed and the actual requirement may vary (Memiši et al., 2009).

Table 2. *Energy and protein requirements of a 20 kg growing kid (Luo et al., 2004)*

Parameters	NRC 1981	2004
ME mJ	5.53	5.69b
Crude Protein, g	51.76	76.5c

a 50 g gain

b 2004 requirements for energy based on doelings and wethers

c metabolizable protein converted to crude protein utilizing NRC 1996

On the basis of these studies, in 2004, the amount of information available about the actual needs of the offspring of goats in nutrients increased, which is essential for making decisions concerning the expected performance of the wide variety of nutritional status. Based on that research NRC in 2007 published new regulations in nutrient requirements of goats which represent a step forward compared to the former regulations from 1981.

NRC (2007) provides a detailed summary of the nutrient requirements for kids and differentiates between dairy, Boer, indigenous local (assumed to be equivalent to

Australian rangeland, but may not be) and Angora. Daily requirements vary according to current or target liveweight, rate of daily gain, gender and are too extensive to list within this review; however Table 3 provides an extract to highlight the differences.

Table 3. Daily dry matter intake (DMI), dietary NDF tolerance, crude protein, protein (CP) and energy (ME) of four goat genotypes at 20 and 30kg LW growing at 200g/d (adapted from NRC 2007).

Genotype	Live-weight	Growth rate	Fiber growth rate	DMI	DMI	NDF limit	CP	ME
	kg	g/day	g/d	kg/day	% LW	%	g/d	MJ/d
Dairy	20	200		0.73	3.7	33	130	9.66
Boer	20	200		0.66	3.3	36	163	8.91
Indigenous local	20	200		0.62	3.1	39	130	8.24
Angora	20	40	8	0.74	3.7	32	84	7.45
Dairy	30	200		1.14	3.8	32	145	11.47
Boer	30	200		1.04	3.5	35	179	10.42
Indigenous local	30	200		0.97	3.2	37	145	9.75
Angora	30	40	8	0.91	3.0	40	100	9.12

Supplemental feeding

The first three days after birth are the most critical days in the life of a newborn kid. If mother rejects the kids, colostrum of kids should be fed three times a day, a total of 2 to 3 pint per day. After three days, kid diet is based on goat milk or milk replacer, which is given twice a day and does not exceed three liters per day. In some cases, the female goats cannot produce enough milk for feeding their kids, especially when it comes to their greater numbers (twins or triplets). For providing adequate daily increment of kids a sufficient amount of the initial starter mixture and high-quality hay must be available from the first days after birth.

Table 4. Nutrition technique for kids under 3 months of age (INRA, 1989)

Nutrition technique	Age of kids	Quantity of milk (kg)	From the 7th day after kidding feeding hay and concentrates ad libidum
Goat milk in 2 meals	By the third day	Colostrum (max. 1.5 kg)	
	31	1.5 kg goat milk	
	32	1.0 kg goat milk	
	33 – 42	0.5 kg goat's milk in the 1st meal	
	85 – 90	Weaning	

Table 4 contains examples of the composition of concentrate mixtures for goats feeding. If the kid feeding is used as milk replacer, it should contain not less than 5% fat, and at least 20% crude protein, which should originate from by-products of milk (Solaiman, 2014). In any case, substitute for milk from cow's milk is less expensive compared to the replacement of goat milk and can be a very good quality food for kids (Memiši and

Bauman, 2003a). Feeding milk or milk replacer could continue up to 8-12 weeks or up to the time the kids are weaned or able to consume 0.2 kg of grain mix daily. Provide a grain mix (kid starter, Table 5) containing high levels of protein (16%) and high levels of fiber (11%) as well as good quality hay to encourage rumen development.

Table 5. *Kid starter grain mix (Solaiman, 2014)*

Ingredient	% of ration
Cracked corn	29.0
Crushed oats	29.0
Wheat bran	29.0
Soybean meal	11.5
Trace mineral salt	0.5
Dicalcium phosphate	0.5
Vitamins ADE	0.5
Protein	15-16%
Fiber (minimum)	10%

For additional weight gain, animals also need nutrients for growth such as 0.55 Mega calorie (Mcal) for every 100 g gain/d, 57 g protein (CP) for every 100 g gain/d., 2.8 g calcium (Ca), 1.3 g phosphorus (P).

Table 6. *Examples of complete meal for starter and mixtures for the growth in nutrition of kids (Sahlu et al., 1992)*

Feedstuff	Kid Starter %	Growing Ration %	Feedstuff	Kid Starter (% dry matter basis)
Corn	27.6	12.9	Corn	70.17
Oats	37.9	10	Oats	2
Soybean meal (44%)	10	8.6	Soybean meal (44%)	24
Alfalfa leaf meal	18	10	Alfalfa meal	2
Cane molasses	5	5	Calcium carbonate	0.81
Cottonseed hulls	0	51.9	Dicalcium phosphate	0.37
Trace mineral salt	1	1	Trace mineral salt*	0.45
Limestone	0.3	0.4	Vitamins A, D and E (premix)**	0.2
Vitamins A, D and E (premix)	0.2	0.2		
Crude protein = 20% Calcium = 0.6%				
Metabolizable energy, Mcal/kg = 3.06 Phosphorus = 0.5%				
* Composition: 98% salt (NaCl), 0.35% zinc, 0.28 manganese, 0.175% iron, 0.035% copper, 0.007% iodine and 0.008% cobalt.				
** Contents (for 2.2 lbs): 6600 IJ vitamin A, 2200 IJ vitamin D and 33 IJ vitamin E.				

The kids that are in the flock for overhaul and further reproduction purposes, which are selected and graded on the basis of production and morphological characteristics of their parents should be weaned at the age of three months. Feeding base of weaned kids should be a good quality pasture with the addition of small amounts of concentrate. The amount of concentrate depends on the condition and the mass of kids, where certain recommendations suggest providing around 100-150 g of concentrate a day. However,

if the pasture is of a lower quality, it is necessary to provide sufficient quantities of good quality lucerne hay. Otherwise, during the weaning, the kids gain decreases, and thereby the consumption of feed per kilogram of gain increases.

Conclusion

Adequate nutrition and rearing of kids is the basis for future high production goats. The production value of each head is greatly dependent on feeding in early age. Poor and inadequate nutrition in this age can have adverse consequences of a permanent character. Kids are mostly fed milk suckling their mother, but in some cases this can also be supplemented. If we use the supplementation in kids nutrition, the number of servings for kids should be the same as the suckling.

Nutrition of weaned kids very much depends on whether the animals are intended for rearing or to be used for breeding. Feeding base of weaned kids should be a good quality pasture with the addition of small amounts of concentrate. The amount of concentrate depends on the condition and the mass of kids. In feeding kids intended for breeding we should strive for those in the age 7-8 months to attain body weight 30-35 kg. In this way they will be in a good shape and well prepared for mating.

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