CANADIAN MEAT GOAT Association
CANADIENNE de la CHÈVRE de BOUCHERIE

Market Kid Feeding

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Introduction

The purpose of any feeding program is to improve the profitability to the farming enterprise. This principle must also be adhered to when evaluating the market and thus any feeding programs for goat kids. Some of the goals that this reasoning addresses, are to induce economical gain, to maximize price at marketing, improving the desirability of the carcass, or perhaps something less direct like genetic evaluation.

Making Meat

A number of factors are important in the development of a carcass, and these factors are the ones one must address to achieve better gains, yields and feed conversions. Three of the most important factors are;

- GENETICS - beyond breed selection alone
- MANAGEMENT - disease prevention, level of care
- NUTRITION - addressing nutrient needs

Each of these topics is worthy of intense attention and discussion. However the focus of this document is nutrition.

Nutrients

To appreciate nutrition, one must first appreciate the nutrients that are discussed under this umbrella. In order of most limiting (the period of survival if a given nutrient is removed) is approximately as follows;

1. OXYGEN – related to air quality and lung health. This is not normally considered a 'nutrition topic' but oxygen delivery to the tissues is the first limiting factor.
2. WATER – is often taken for granted. Its cleanliness, hardness & purity will affect intake. Remembering that the vast majority of live-weight gain (or body mass) is comprised of water, highlights the importance of ensuring adequate water intake.
3. ENERGY – is a significantly more complex issue. Energy can be derived from carbohydrates, fats or protein. In most agricultural applications, carbohydrates are the preferred energy source on a cost basis. This includes structural carbohydrates, such as the fibre in forages, and non-structural carbohydrates such as the starches in grains.
4. PROTEIN – protein nutrition in the ruminant species is clearly their biological advantage and is of practical interest. Due to the rumen environment ruminant animals (including goats) can utilize poor quality proteins, and even nitrogen rich materials to yield microbial protein. The proteins from these organisms are then available to the hindgut. The

importance of this concept is that true protein (amino acid containing structures) and urea (a non-protein nitrogen source) may register as being equal as a crude protein (CP). However for some advanced feeding programs a differentiation must be made.

5. VITAMINS AND MINERALS – allow metabolic and chemical reactions to take place, and are critical in long-term structure and function. The body has significant reserves of many of the nutrients in these groups. Many vitamins are synthesized in the body while others are not, and must be included in the diet. All minerals that are required must be supplied in the diet.

Feed Conversion

Feed conversion is a benchmark that is used in most meat producing species to evaluate the efficiency of the overall process of converting feedstuffs to saleable livestock. Typically, it is expressed as F:G; the amount of feed dry matter (corrected to 0.0% water content) required to produce the same units of live weight gain. It is independent of units, so metric or imperial measures will yield the same result. A lower number represent superior feed conversion. Some typical values from other species are given in Table 1 as a source of comparison between meat goats and other industries.

TABLE 1. Typical feed conversions for various meat producing industries, including specific data from the Langston Buck Test program (Oklahoma State University).

SPECIES OR INDUSTRY	FEED CONVERSION (F:G)
Feedlot Cattle	6.5 – 6.0 : 1
Grain-fed Veal	4.0 : 1
Grain-fed Lamb	3.2 : 1
Broilers	2.5 : 1
Anecdotal reports on Boer Goats	15 – 10 : 1
Langston Buck Test	
average 2001	6.3 : 1
single best Buck	3.89 : 1

A number of other factors that might affect feed conversion are addressed previously, but health management and genetics are clearly limiting factors.

A Goat's Digestive System

The goat being a ruminant animal, the organ of the goats' digestive system and process we are typically most concerned with is the rumen itself. The rumen is one compartment in the complex stomach in which fermentative digestion takes place. That is, the goat makes this compartment 'home' to microbes which ferment fibre, as an animal itself does not have the enzymatic digestion ability to utilize forages. In return, the microbes do release useable nutrients, and the animal itself eventually will digest this microbial yield in the true stomach and intestines. One downside of this rumen process, is that large amounts of digestible starch may acidify the rumen (acidosis). The goal is to limit concentrate use in adults, or to provide it in coarse, slowly digestible forms.

This rumen compartment is not developed in the newborn kid. In fact, the stomach is very similar to that of other newborn mammals. The development of the rumen involves a fold in the neonates' stomach enlarging until it becomes a massive, nearly separate compartment. During this time, the animal functions like a simple stomached animal (such as a human) and grain is more efficiently used, urea-type nitrogen is not utilized, and forage breakdown is not as developed as in the adult. As a result, the pre-weaning period offers an excellent opportunity to feed grains, as they will improve growth, have efficient use at this age, and they will spur the development of the rumen. However, before any grain feeding commences, a herd clostridial vaccination program should be discussed with a veterinarian.

Expectations of a Feeding Program

Part of the decision tree of how to implement a feeding program is related to two

important factors. Firstly, the production system under which the kids are produced, and secondly, the endpoint to which they are taken. That is to say, the size or weight they are marketed at, as wellas the time of year during which the feeding program is conducted might affect feed resources.

Production System Considerations

The performance achieved in different systems are different, and will affect growth rate and thus days to market (DTM). The systems below give an idea of ranges;

Grass based system (annual) – these are systems where the time of kidding is coordinated with the pasture resource, such that late gestation and lactation demands can be met on low-cost pasture. Typically it is from May to September. It is often an economical system under which to manage females, but requires aggressive pasture management, such as rotational grazing. Typically a low rate of gain (1/5 to 1/3 lb. per day) of lean growth is achieved (very little 'finish' or fat cover). With the addition of creep at pasture, or a grain-feeding period at weaning, average daily gains (ADG) of 1/3 to 1/2 lb. per day might be achievable.

Annual Fall and Winter Kidding – These will depend on stored forages to meet the doe's requirements for lactation. Again, the gains in the kids depend on the quality of the doe ration (milk yield) and the level of grain feeding. The rate of gain might vary from 1/5 lb./day on a poor forage doe ration with no creep, up to 1/2 or 3/4 lb. ADG for kids from well nourished does that are well creep fed and then fed grain after weaning. Any of these higher performance grain systems tend to deposit more fat than the very lean pasture kid.

Accelerated Systems – depending on the time of year for a particular kid crop, the performance would reflect the resources made available to a particular kidding group. They might range from pasture gains to confinement gains. Typically, however accelerated systems are heavily grain based and many kids might be able to perform at the 1/2 to 3/4 lb. ADG level after weaning.

Endpoint

What does the local market demand? A heavier or lighter carcass (liveweight)? Any fat at all? Preferably no fat? These will affect the level of grain and the DTM. Another important consideration is the fate of replacements. Recent evidence in sheep supports the long-standing observation in cattle, that rapid growth and especially fat deposition in replacement females has long term consequences on milk production, and stayability. It is only reasonable to apply this caution to replacement does. That means that the future breeding females should be identified as soon as possible, and if any grain-based system is used for market kids, that the does not be included in that feeding program.

Preparing Market Kid Concentrates

A number of guidelines or 'Rules of Thumb' should be observed on preparing grain rations as creep or basal feedlot rations for kids.

1. **Particle Size** – ensure appropriate particle size. Too large may impede intake, too fine contributes to acidosis.

a. all grains rolled to 20 lbs. BW
b. corn rolled from 20 to 50 lbs.
c. all grains whole 50 lbs. +

2. **Fibre intake** – ensure effective fibre intake. This is also known as 'scratch factor' or the stimulus to ruminate (cud chewing). This can be achieved by grain coarseness. If fine ground feeds must be used (such as in pelleted feed) ensure hay or other fibre is at least 10 percent of the diet.

3. **Bunk Management** – monitor and ensure feeder space (Table2) and monitor and control intake of grain. There are basically two main strategies for bunk management;
   - Limit Feeding – can function as an animal management tool, making animals get up for feeding and thus used as a health check. It allows the producers to control intake; both to ensure proper intake of different diet components, and the actual volume or weight of feed delivered. Limit feeding tends to improve feed conversions, however is labour intensive.
   - Free Choice Feeding – is often used as it is less labour intensive than limit feeding, and the hoppers allow for instant storage of entire bags or batches of feed and require less frequent filling. However, there is no control over intake. There is a high risk of sorting diet components, especially with textured feeds.

4. **Diet Type** - there are essentially two types for kids; textured and pelleted.
   - Textured Diets – consist of blended commodities (whole or coarse grains) and occasionally pellets as a carrier for minerals and feed additives. Often, wet molasses is used to prevent sorting, to stimulate intake and to bind minerals and medications to feed especially, if there is no pellet components. They are often referred to as 'sweet feed' if molasses is used. Textured diets are most ideal in limit feeding systems where sorting is not an issue. They can be purchased, or manufactured on-farm
   - Pelleted Diets – are ideal in free choice systems, as they prevent sorting and there is a balanced diet in every mouthful. However, due to the grinding of the grain for pelleting, the effective fibre is reduced and hay should be on offer for fibre. The reliance on a pelleting mill might also make this option less workable.

5. **Creep Feeding** – begin creep feeding at 7 to 10 days of age. Previous to this, intake will be minimal and the feed susceptible to wastage. Creep rations should be approximately 18% crude protein (CP), 80+% total digestible nutrient (TDN)

6. **Starter Rations** - feed the creep diet for 2 weeks after weaning. Small changes like amount of processing (particle size) can be made, but keep ingredients the same.

7. **Finishing Ration** - 55 lbs. liveweight and up, and not for replacement females. 16 to 17% protein, 75 to 80% TDN.

8. **Changing rations** – when changing from Starter (creep) to Finishing rations, allow 7 to 14 days for the transition, slowly introduce the new diet at no more than 10% of intake, and blend it in at higher and higher levels until 100%. When moving from forage to grain based rations allow at least 3 weeks for adaptation from forage to grain, again using an incremental approach.

9. **Hay** – and other forages are not absolutely required for market kids on all-grain rations that are coarse. For ground rations or pelleted rations, at least 10% (and

preferably 20%) of the diet should be offered as good hay. Replacement females can be grown on good forage and a small amount of grain (1/4 to 1/2 lb. day) from 55 lbs. on.

10. **Protein Sources** – the protein in the market kid ration should take into consideration a few points;
    - Vegetable Proteins - may have ideal amino acid profile, but the portion that will reach the hindgut is a small portion of total CP. That is, there is often very little rumen escape or 'bypass' protein. Often there are metabolic, anti-nutritional, palatability or availability factors associated with some vegetable proteins.
    - Animal Proteins – ensure large amounts of rumen escape, limiting amino acids and are an easy way to meet requirements, so are difficult to replace in all vegetable based rations. To date, as long as ruminant meat and bone meal byproducts are not used, they are acceptable. They need not be removed from goat rations unless a need is demonstrated.

11. **CP Fraction Rules** - do not exceed 1/3 of CP from non-protein nitrogen supplements (such as urea), and use these only in animals exceeding 60 lbs. liveweight. Be cautious in the use of large amounts of silages for young kids. For highly productive animals such as accelerated does and feedlot kids, ensure 1/3 of CP as high quality rumen escape protein.

12. **Use coccidiostats** – Coccidiosis is a protozoal infection to which adults are immune but are carriers. It causes grayish diarrhea in kids which reduces performance and accelerates its spread. Cocci burden can be lowered in the herd by undertaking a program with your veterinarian for the feeding of ionophores such as Rumensin, Bovatec, Deccox in the mineral, creep or grain supplements.

13. **Animal Density** – ensure sufficient area per kid (Table 3). Failure to do so may likely result in Pneumonia and poor performance

14. **Clostridial Diseases** – the incidence of clostridial type diseases (Pulpy Kidney, Overeating Disease) are often increased on market feeding programs. They can be prevented by implementing a routine herd vaccination program with the advice of your veterinarian.

15. **Monitor Performance** – initiate and manitain records on health, intake and performance as well as DTM for future reference and calculations.

Table 2. Feeder and Waterer Space Allowances for goats

Class of Animal	Feeder Space				Waterer Space		
	Limit Fed		Self Fed		Bowl or Nipple	Tank	
	(in/hd)	(cm/ hd)	(in/hd)	(cm/hd)+	(hd/bowl or nipple)	(hd/ft)	(hd/m)
Does	16-20	41-50	4-6	10-15	40-50	15-20	49-66
Bucks	12	30	6	15	10	2	7
Young Kids >30 kgs	9-12	23-30	4	10	50-75	25-40	82-131
Weaned Kids <30 kgs (66 lbs.)	-	-	1-2	3-5	-	-	-

Source: Ensminger & Parker, Sheep & Goat Science, 5th Edition 1986 pg 304. Morhand-Fehr, in Goat Production, 1981, pg 271
Cells marked with a (-) no specific information available. Limit fed is also often referred to as Hand Fed.

Table 3. Guidelines for Space Requirements for Housing Goats

Class of Animal	Building Floor Space		Lot Space			
			Dirt		Paved	
	(ft^2/hd)	(m^2/hd)	(ft^2/hd)	(m^2/hd)	(ft^2/hd)	(m^2/hd)
Does	12-18	1.1-1.7	25-40	2.3-3.7	16	1.5
Bucks	30-40	2.8-3.7	100	9.3	-	-
Young Kids >30 kgs	8-10	0.7-.09	20-30	1.9-2.9	10	0.9
Weaned Kids <30 kgs (66 lbs.)	3-5.5	0.3-0.5	-	-	-	-

Source: Ensminger & Parker, Sheep & Goat Science, 5th Edition 1986 pg 304. Morhand-Fehr, in Goat Production, 1981, pg 271

Conclusion

For goats with the genetics to perform, there are many opportunities to increase productivity with a market kid feeding program. However, the importance of understanding the production system under which they are produced, as well as the end market are critical in determining the approach. Regardless of the specific approach, there are a number of 'Rules of Thumb' that can be helpful in determining the proper course of action for each specific program.

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