

FINISHING OF LAMBS IN FEEDLOTS



The finishing of lambs in a feedlot is much more complex than what is generally accepted. The big problem with sheep is that they are very likely to suffer from acidosis if adaptation, nutrition and management are not handled with the necessary expertise. Acidosis is associated with soft to runny droppings, rigid legs, hoof problems, and can even lead to large-scale mortalities. A sheep feedlot, therefore, requires a lot more expertise, as well as a higher management level than a cattle feedlot. On the contrary, it compares very well with the inputs required for a dairy.

WHY FINISH LAMBS?

The main motivations for finishing lambs can be rationalised as follows:

- More ewes can be kept and, therefore, meat production per hectare is increased by vertical expansion of the sheep farming enterprise.
- In an eight-month lambing system, huge pressure is put on pastures and ewe condition. The early weaning of lambs, therefore, releases pastures for the benefit of ewes.
- During times of drought, veld degradation and overgrazing can be reduced or prevented.
- Ewes regain body condition faster and can be mated again sooner. For every 1.0 kg increase in weight during the mating period, lambing percentage increases by 1 to 1.5 percent.
- Increase in meat prices and/or lower grain prices may make finishing of lambs more profitable for certain periods, even with only one lambing season per year.
- Feedlot finishing results in better gradings, heavier carcasses and earlier marketing ages.
- Risk can be distributed by finishing only a portion of the lambs and thus marketing the lambs at different times.

CRITICAL FACTORS IN FEEDLOT FINISHING

1. Acidosis (Suurpens)
2. Adaptation
3. Feed Conversion Efficiency (FCE)
4. Average Daily Weight Gain (ADG) or, in other words, growth rate
5. Feed composition and frequency of feeding
6. Feed trough space and height
7. Water quality and management
8. Preparation before entering the feedlot
9. General

ACIDOSIS

When rations that are high in starch are fed to ruminants, lactic acid often accumulates in the rumen. Under these conditions, the pH of the rumen content decreases significantly. This leads to a major change in the composition of the rumen microbial population, which can result in the animal becoming seriously ill, or even dying. Acidosis also causes the death of many rumen bacteria that specifically digests cellulose and consequently the animal's ability to digest fibre will decrease drastically. All of these factors cause feed intake to decline and growth to be severely affected. Physical signs of acidosis are soft to runny droppings, rigid movements and painful hooves. Sheep's eyes are also sunken and the mucous membranes in the mouth can become dry.

Of all ruminants, sheep are most likely to suffer from acidosis due to their more selective feeding habits. Since about 95 percent of all grain in a ration is digested in the rumen, rations containing high levels of grain are not ideally suited for sheep. The total starch content of the ration must be reduced by the inclusion of lucerne hay or other roughages. Due to its palatability, lucerne is the first choice. If straw or hay is used, there are almost always problems with selective eating of the grain component. The use of molasses, and preferably molasses syrup, to bind mixed rations, is effective in preventing the selection of certain feed components.

The use of whole grain also contributes greatly to the reduction of acidosis. This is especially true for small grains, which are very prone to causing acidosis and become much less dangerous when it is fed whole. With every mouth full consumed, only a third of the grain is chewed. The starch of the remaining whole pips is, therefore, not immediately available for the rumen microbes to be converted to lactic acid. These whole pips are then later, when the sheep is relaxed, masticated further through rumination. Starch availability for lactic acid formation is thus distributed over a long period, which allows the rumen to process the lactic acid to a source of energy before levels rise too high. When using whole grains, carcass fat is firmer and tends to be whiter than when ground and pelleted feeds are used. This is due to lower propionic acid levels in the rumen, which means that less linoleic acid (C18:2n-6), an unsaturated fatty acid, is deposited in the fat. Effectiveness of weight gain is also better on whole grain rations. Table 1 illustrates the results of early weaned lambs that were finished on a ration of which barley inclusion (in a whole, ground or pelleted form) was 78.5 percent (Livestock Feeds and Feeding). The average initial weight of the lambs was 16.1 kg and the average slaughter weight was 37.7 kg.

Table 1. The effect of physical form of grain in lamb finishing ration on production results

Measure	Physical form of grain in ration		
	Whole	Ground	Pelleted
Feed consumed (g/day)	941	976	1048
Weight gain (g/day)	334	311	324
Feed/weight gain	2.60	2.89	2.92
Dressing percentage	42.7	42.1	44.0
Rumen pH	6.55	5.85	5.92

The inclusion of an effective buffer, such as Acid Buf, in the feed is very important because of the high risk of acidosis in sheep. For the prevention of acidosis, the most important tools are sufficient adaptation, enough fibre in the ration and the inclusion of a good buffer.

ADAPTATION

Adaptation of lambs on complete feedlot rations is incredibly important. It must be a systematic process, since the specific rumen microbial population which digests starch, is almost absent in the rumen of a lamb that is grazing on pastures. These microbes' numbers increase gradually and when the switch to energy-rich rations takes place too quickly, acidosis occurs.

The practice of creep feeding (only pre-weaning) is the best preparation for feedlot feeds, since lambs are then already adapted to a starch-rich ration. These lambs also take to the feedlot feed promptly, leaving only the adaptation to the feedlot environment that has to be managed. Lick supplementation before lambs are transferred to the feedlot also have great benefits in terms of adaptation. With the intake of starch-containing products in the lick, the proper rumen microbial population already begins to establish. With lambs coming from pasture, the following procedure must be strictly adhered to, in order to adapt their rumens:

1. Make sure there is enough trough space.
2. Make sure that drinking water is always fresh and clean.
3. Provide ad lib roughage. Lucerne hay is the roughage of choice. Straw must be milled and treated with molasses syrup to ensure intake (60 – 70 kg molasses syrup per ton of straw). To be safe, the same procedure must be followed for oat hay. The initial, additional lucerne hay must preferably be offered as long hay. After adaptation, straw or hay will no longer have to be milled. If animals voluntarily eat more than 200 g roughage per day after adaptation, the ration's composition or taste must be investigated. When using small grain-based rations, it is advisable to provide additional roughage throughout the entire finishing period.
4. Once lambs are calm, they can receive 200 g per lamb per day of the feedlot ration.
5. Increase the level with 100 g of feed per lamb per day.
6. As soon as food is left over in the troughs, the feed can be increased by 50 g per lamb per day.
7. Lambs have only been properly adapted when not all the available feed has been eaten for five consecutive days.

Adaptation should, therefore, always be done slower rather than faster.



When adaptation is used for a predetermined, fixed period, for example, that lambs will be adapted after 7 days, the potential for errors are great. In most cases, lambs will over-consume if a feed is offered ad lib from the start. A lamb can eat up to 3 kg of feed per day under such circumstances and could be dead or near death by the next day. The period that lambs with such metabolic disturbances should then spend in the feedlot in order to reach their target weight can easily be extended with up to a week or more.

FEED CONVERSION EFFICIENCY (FCE)

Feed conversion efficiency is the amount (kg) of feed required for 1.0 kg live weight gain. Table 2 shows how feed conversion decreases with increasing age.

Table 2. Influence of age on FCE of sheep (kg DMI per kg increase in body weight)

Age (days)	Mass (kg)	ADG (g)	Feed conversion (kg/kg)
0 - 42	4.5 – 15	250	1.0 : 1
42 - 60	15 – 20	250	3.0 : 1
60 - 80	20 – 25	250	3.5 : 1
80 - 100	25 – 30	250	4.0 : 1
100 - 120	30 – 35	250	4.5 : 1
120 - 140	35 – 40	250	5.0 : 1
140 - 160	40 – 45	250	5.5 : 1

It is, therefore, clear that it is not very effective to start the finishing of lambs at a relatively late age. Young lambs that received a creep feed are the most effective animals for finishing. Average FCE should be about 4.5:1 during the total feeding period.

AVERAGE DAILY WEIGHT GAIN (ADG)

ADG, or growth rate, is the average daily weight gain (gram) during finishing or a phase of the finishing period. Table 2 shows the expected ADG for lambs at different ages. These lambs and their mothers were fed to meet their needs, and thus did not receive supplementary feeding.

The data in Table 2 only serve as guidelines. Depending on breed or breed crossings, large differences in ADG values may occur.

Where creep feed is fed, it is expected that ADG before weaning will, on average, be 25% better (Table 3). The effective utilization of creep feed is due to the lambs' very good FCE and ADG potential at an early age.

Table 3. The influence of creep feed supplemented on harvested small grain camps on Mutton Merino lambs who received creep feed for 96 days (Brand & Brundyn, 2015)

	Creep Feed	No Creep Feed
Initial body weight (kg)	4.5	4.5
Final body weight (kg)	36.5	30.6
ADG (g/day)	250	200

A balanced feedlot ration has a positive effect on both FCE and ADG, especially due to the higher energy density. Table 4 shows that finishing rations greatly improve the FCE at different ages (compared to Table 2), but that the weakening trend due to age occurs throughout. ADG for growing lambs' remain relatively constant, but the weaker FCE means that older lambs must eat more in order to maintain the same daily growth.

Table 4. The effect of age on the average production parameters of Mutton Merino lambs that were finished in a feedlot from the same starting age (Van der Westhuizen, 2010)

	Days before slaughter in feedlot				
	21	42	63	84	105
Weaning age (days)	144	144	142	145	143
Slaughter age (days)	165	186	204	229	247
Feed intake (kg / lamb for period)	29.1	72.6	114.5	166.9	215.3
ADG (g/day)	437.9	348.0	317.8	326.4	320.9
FCE	3.3	4.8	5.5	5.9	6.2

Finishing of lambs in a feedlot thus dramatically improves the effectiveness of lamb growth, but in order to be optimally productive, lambs should reach slaughter weight as soon as possible to utilize the full benefit of age related FCE.

FEED COMPOSITION AND FREQUENCY OF FEEDING

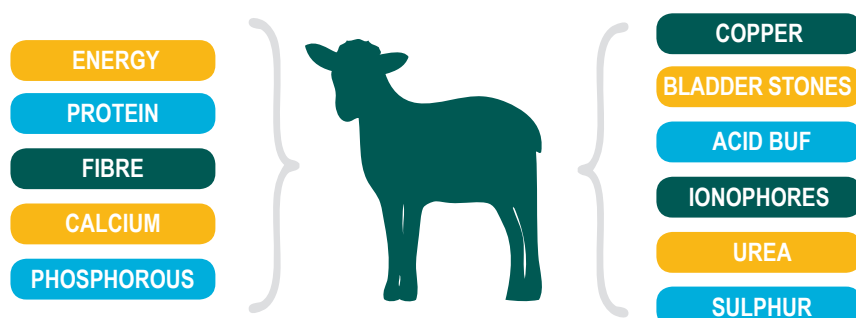
- Use a balanced ration
- Avoid dusty feeds
- Use a highly palatable feed

The more times lambs are presented with feed per day, the better the growth results. On the farm effort must, therefore, be made to provide fresh feed at least two or three times per day. The leftover feed of the previous feeding session should be removed before the following feeding; but practically speaking at least once a day. The leftover feed is contaminated with saliva and is no longer palatable. Over time, too much unacceptable feed will accumulate and feed intake will decrease. Leftover feed that has not been removed for long periods can be a medium for mould growth with the associated danger of mycotoxin toxicity.

Two approaches can be followed with the mixing of feedlot rations:

1. Complete mixed ration that includes a roughage component.
2. Cafeteria system where the concentrate and roughage components are fed separately.
A chocolate grain mixture is also an example of a concentrate.

The following factors are important during the compiling of the finishing rations:



1. ENERGY:

Energy is the most important component of the feed, as it largely determines the rate of growth. Energy that is too high is almost more harmful than when it is too low. With slightly low energy levels, lambs can compensate by eating more, where levels that are too high can quickly give rise to acidosis, which immediately impairs growth and efficiency. Quality energy is obtained from the starch of grains with the consequence that grains are always a major component of a feedlot ration. An energy level of approximately 66 percent TDN or 10 MJ ME serves as a minimum guideline.

2. PROTEIN:

The inclusion of good quality oilcake meal is important, as the provision of quality protein is essential for muscle development. It also helps prevent lambs from becoming overly fat at an early age. Especially in the case of breeds like the Dorper, which tend to put on too much fat too quickly, the inclusion of quality protein plays an important role in preventing this. Protein must, therefore, not be obtained from just NPN sources (such as urea). The protein level of a complete ration must be at least 13 percent.

3. FIBRE:

As mentioned in the section on acidosis, crude fiber inclusion is important to help dilute energy to acceptable levels and to ensure optimal rumen metabolism. Consumed nutrients are best utilized when the rumen functions optimally. Ruminants' existence is due to their ability to convert crude fiber into useful nutrients and, consequently, it is logical that a minimum amount of crude fiber should be fed throughout.

4. CALCIUM:

Calcium is important for muscle development, transmission of nerve impulses, contraction of muscles (including the heart) and blood clotting. Insufficient calcium in the ration causes calcium to be withdrawn from the skeleton, which could in turn lead to bone fractures and osteoporosis over time. An excessive intake of calcium results in excess calcium being excreted through the digestive tract and kidneys in the form of calcium phosphate. This can induce phosphorous deficiency. Young animals absorb calcium very effectively compared to older animals that absorb calcium very poorly. For the optimal utilization of calcium and phosphorous, the calcium:phosphorous ratio should be about 2:1.

5.5. PHOSPHOROUS:

Phosphorous is, among other things, essential for effective energy metabolism. It extends from the absorption of carbohydrates to the storage of energy in the body. Since the purpose of lambs in a feedlot is effective growth, it is clear that it will not be achieved without enough phosphorous in the feed. Sheep is particularly economical in the use and recirculation of phosphorous through saliva to the rumen. They are also excellent selective grazers. The ration, which is the sole source of nutrition in the feedlot must, therefore, contain sufficient levels of phosphorous. However, note that levels of phosphorous which are too high in the ration can cause the formation of bladder stones.

6. COPPER:

Sheep are very sensitive to chronic copper poisoning. Chronic copper poisoning is caused by the sheep's poor ability to

excrete excess copper. Therefore, where sheep are exposed to copper levels that are higher than their requirements, copper quickly accumulates in especially the liver. This is a unique characteristic of sheep. Such high levels of copper in the liver can be completely harmless under normal circumstances. Acute copper poisoning occurs when a sheep with relatively high levels of copper in the liver is exposed to a disease or strain. Under such circumstances, large amounts of copper can be released from the liver into the blood. This leads to a breakdown of the blood cells, jaundice and even death. Therefore, it is important to keep the copper inclusion levels of complete sheep rations below 12.5 mg/kg on an air-dry basis in order to prevent accumulation of copper in the liver.

7. BLADDER STONES:

Bladder stones are promoted by feeds with high levels of protein and phosphorous, especially if the calcium and magnesium content of the ration are not increased as well. The ratio of calcium, phosphorous and magnesium is, therefore, more important than the total amounts of each mineral. Bladder stones form in the bladder and consist mainly of phosphorous. If it is excreted through the urinary tube, it can become stuck. Because male animals have a long urinary tube, they are much more prone to these blockages than female animals. Wethers, however, are more prone to blockages than rams, as their urinary tube is even narrower than that of rams. High levels of lupins in rations increase the appearance of bladder stones. To prevent bladder stones, 0.5 to 1.0 percent ammonium chloride is included in the ration. However, the most important preventive measure is to make sure that the phosphorous levels in the feed is not too high and that the feed contains the correct ratio of phosphorous, calcium and magnesium.

8. ACID BUF:

Acid Buf prevents the pH in the rumen from falling to low due to high levels of grain intake. It absorbs 2 to 3 times more acid than sodium bicarbonate (bicarbonate of soda) at normal rumen pH levels. This great advantage is due to Acid Buf's unique honeycomb structure, which results in a large absorption area. Acid Buf buffers the rumen for up to 4 times longer than bicarbonate of soda and also contains high levels of available calcium and magnesium. Furthermore, it contains the full range of trace minerals that serves as rumen activators. The inclusion of Acid Buf in rations thus helps maintain normal rumen microbial activity and fiber digestion. Feed intake is improved and feed intake rates are regulated. This leads to more effective fermentation, providing more nutrients for production functions, such as meat and milk. As already indicated, acidosis is one of the biggest potential problems during the finishing of lambs. The inclusion of Acid Buf in the ration can reduce or even prevent this risk. No finishing ration should be mixed without a buffer such as Acid Buf.

9. IONOPHORES:

All finishing rations must contain ionophores to help prevent coccidiosis and acidosis. Feed conversion is also improved by 10 to 15 percent. Ionophores are not hormones or growth stimulants, but rather growth promoters. The decrease in appearance of acidosis is caused by the ionophores' effect on the rumen microbes. Less lactic acid, which causes acidosis, is produced in the rumen. It is important to note that ionophores are deadly to the horse family and they should, therefore, not have access to feedlot rations.

10. UREA:

Because ruminants' rumen microbes have the ability to use nitrogen (N) as a source for protein production, non-protein nitrogen (NPN) sources are used very effectively as partial protein sources. This distinguishes ruminants from monogastric animals that require only true protein sources, which are broken down to amino acids before absorption in the small intestine. NPN is toxic to monogastric animals. Urea is the most popular and economical NPN source for ruminants. The nitrogen in urea is used by rumen microbes to produce protein for their own growth. Microbes that die are then broken down to amino acids in the stomach and small intestine. These amino acids are then absorbed in the same way as in monogastric animals. It is, therefore, the microbes that use the NPN directly, and not the animal itself. However, if urea is consumed at levels that are too high for the rumen microbes to utilize, it becomes just as toxic to ruminants as to monogastric animals. (Precautionary measures against urea poisoning are discussed under the Unprotected Feed of the Bad Practice section)

11. SULPHUR:

Although rumen microbes have the ability to produce proteins from nitrogen as a base source, they also need other nutrients to achieve this. Two of the amino acid building blocks of protein, namely cystine and methionine, contain sulphur as part of their molecular structure. Where high levels of NPN are used in rations, there is usually a shortage of sulphur to ensure adequate and effective utilization of the urea. Accordingly, the microbes cannot complete the production of proteins, as the building blocks can not be formed due to lack of sulphur. Therefore, rations containing urea must always be supplemented with extra sulphur in the correct ratio to nitrogen.

Table 5. Examples of typical finishing rations and chocolate grain-based concentrates

Raw Materials		Complete Finisher (Classic)	Complete Finisher (Crude Fiber)	Complete Finisher (Oats)	Choc Grain (Barley)	Choc Grain (Oats)
Barley		800.00	550.00	300.00	850.00	450.00
Oats				500.00		400.00
Molasses meal		80.00	80.00	80.00		
Canola Oilcake		100.00	100.00	100.00	100.00	100.00
Lucerne Hay (good)			250.00			
Choc Grain 69					60.00	60.00
Mutton Gainer 125		32.00	32.00	32.00		
Acid Buf		4.00	4.00	4.00	4.00	4.00
TOTAL		1016.00	1016.00	1016.00	1014.00	1014.00
NUTRIENTS						
DM	g/kg	895.71	893.25	895.71	899.09	899.09
ME	MJ/kg	10.72	10.01	10.22	10.70	10.29
TDN	g/kg	716.04	665.60	679.13	714.25	684.66
NDP	g/kg	37.96	40.42	25.65	39.36	29.50
Crude Protein	g/kg	161.12	174.66	158.66	165.02	163.05
Urea	g/kg	11.23	11.23	11.23	11.88	11.88
Crude Fiber	g/kg	76.38	126.82	97.54	73.47	90.43
Calcium	g/kg	7.08	9.89	7.53	10.17	10.52
Phosphorous	g/kg	3.55	3.35	4.04	4.14	4.53
Magnesium	g/kg	1.95	2.52	2.25	2.17	2.41
Sulphur	g/kg	2.36	2.68	2.26	2.72	2.64
Potassium	g/kg	5.48	8.35	5.82	4.35	4.62
Sodium	g/kg	1.36	1.90	1.45	1.04	1.12
Chloride	g/kg	4.00	4.88	3.95	2.44	2.40

Classical Finishing Feed

This feed is commonly used in the Southern Cape and basically consists of cereal grains and protein. Because it is easy to mix, it is a favourite among many farmers. Take note, however, of the extremely high energy of 71.6% TDN. The high energy does not necessarily mean that lambs grow faster. The starch is too much for effective utilization and even if the faeces excreted aren't loose, the rumen cannot function optimally under such circumstances. A separate hay source must, therefore, be available to give lambs the choice to dilute the feed when needed.

Complete Finisher with Crude Fibre

In Table 5, lucerne hay is included in the ration. Compared to the first example, 250kg of barley is replaced with crude fiber. The energy drops by five percentage points to 66.6% TDN. The rumen should, however, function better with this crude fiber inclusion despite the lower energy level. There is enough energy provided – but not a surplus – and the ration should also be cheaper. Oat hay or barley/wheat straw can also be used to reduce the energy. Selective consumption, however, tends to be a problem. Molasses syrup can solve the problem by binding the ration together. Approximately 40 kg molasses syrup replaces 80 kg of molasses meal.

Complete Finisher with Oats

If good quality oats is available, the same energy dilution effect can be obtained as with the inclusion of roughage. By replacing 500kg of barley with oats, the TDN drops to 67.9 percent. The energy is thus reduced to acceptable levels without including roughage. A further benefit is the inherently good characteristics of oats – lambs are more vigorous and healthy. The quality of oats is important, as poor oats can be compared to straw. Poor quality oats will decrease the energy levels of the ration too much, with a resulting decrease in growth rates. The use of poor quality oats has, therefore, led to the perception that oats can not be used in sheep feeding.

Chocolate grain with Barley

As with the Classical Finishing ration, the TDN of 71.4 percent is very high. However, it is an easy mixture to mix and handle. Feedtek Choc Grain 69's composition is of such a nature that it has very strong built-in buffering properties. For this reason, a chocolate mixture performs better than is often expected. With the further addition of Acid Buf, such mixtures perform well beyond expectations.

Chocolate grain with Oats

If 400 kg of barley is replaced with oats, the same lower energy content is basically reached as with the complete finisher with oats. The energy drops to 68.5 percent TDN. Without adding roughage sources, the energy level thus decreases to a more acceptable level.

Feedtek MUTTON GAINER 125 is a protein, mineral, trace mineral concentrate for the home-mixing of sheep feeds. Benefits include:

- Most concentrated sheep concentrate on the market
- Allows maximal use of own / locally available raw materials
- Contains a palatant – facilitates adaptation and improves intake
- Contains buffer and ionophores – prevents digestive disorders and improves growth and feed conversion
- Contains ammonium salts – prevents urinary calculi in small stock

Feedtek CHOC GRAIN 69 is a protein, mineral, trace mineral concentrate for the home-mixing of sheep feeds. Benefits include:

- Most concentrated chocolate grain concentrate on the market
- Contains hydrated lime – best adhesive and excellent buffer
- Contains ionophores – prevents digestive disorders and improves feed conversion
- Contains ammonium salts – prevents urinary calculi in small stock

FEED TROUGH SPACE AND HEIGHT

The ideal trough space for lambs in a feedlot is when all lambs are able to eat at the same time. As lambs grow, the feeding space that might have been adequate during adaptation will not necessarily be sufficient for the entire feeding period, if measured according to the above criteria. According to the literature, it appears that the number of shy-feeders and non-feeders will increase if the feeding space is less than 12 cm per lamb. If lambs are fed more than once a day, feeding space of between 10 and 16 cm per lamb must be available. To ensure maximum feed intake, it is, therefore, suggested that 25 to 30 cm of feeding

space is provided per lamb. One will note that the ideal feeding space recommendations for lambs are very similar to that of feedlot cattle. The reason for this is that the natural social behaviour of sheep and cattle are quite different. If food is available ad lib, individual cattle will feed as they grow hungry compared to sheep that will predominantly go to the feeding trough as a group. Better feed intake is obtained with feeders that are 25 to 40 cm above the ground surface, as opposed to troughs that are positioned at ground level. Prevention of contamination of feed with soil, manure and urine is important. Feeding troughs should be placed as far away as possible from the water points to limit contamination of water with feed.

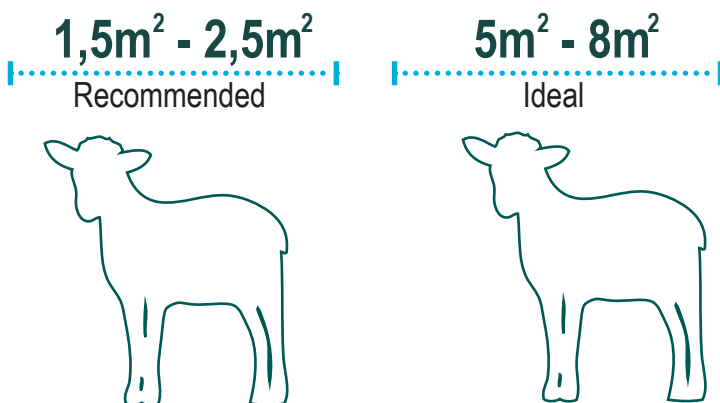
PREPARATION BEFORE ENTERING THE FEEDLOT

- Try to shear lambs three to four weeks before intake, especially in summer. Sheared lambs often have a higher feed intake and better FCE (5.1:1 versus 6:1). However, if cold and/or wet weather is expected, it is not advisable to shear, as FCE may decrease due to the extra energy required by lambs to maintain their body temperature.
- Dose lambs with an effective broad-spectrum anti-internal parasite product and inoculate them against pulpy kidney. Other inoculations are only done when specifically required for certain circumstances.
- Injections of vitamin A & E, as well as Multimin without copper, before intake are recommended. Alternatively, trace mineral blocks can be provided ad lib during finishing.
- Implant ewes and wethers with a suitable ear implant. It's not profitable to do this with rams, as they themselves produce enough male hormones. However, market rams before secondary male characteristics appear.
- Sort lambs into homogeneous groups by race, weight and gender. The ideal group size is 50 lambs per camp, with a maximum of 100.

GENERAL

As a management target, mortalities should be less than 0.5 percent. If it is above one percent, the cause must be seriously investigated.

Feedlot surface area per lamb must be sufficient. Approximately 1.5 to 2.5 m² per lamb is generally recommended while 5 to 8 m² is considered to be ideal



UNDESIRABLE PRACTICES

1. Unprotected feed
2. Self-feeders
3. Unclean water
4. No shade

UNPROTECTED FEED

To prevent urea poisoning, feed must be protected from the rain. The following section on General urea warning describes more details.

SELF-FEEDERS

Self-feeders should preferably not be used in feedlots. The contamination of feed with saliva is a big problem with self-feeders. Saliva contamination causes the feed to be less palatable, leading to lower feed intakes. According to Dr. Jasper Coetzee, observations have shown that lambs fed with in-line troughs, grew up to 130 g per day faster than where self-feeders were used. If self-feeders are used, they should be managed in such a way that saliva contaminated feed does not accumulate.



WATER

The fact that water is one of the most important nutrients for any animal is often forgotten. Effective kidney function requires that sufficient amounts of water are regularly consumed. Lambs that do not drink enough water will eat less feed, which will result in lower weight gain. Clean and cool drinking water must, therefore, be available at all times. Water troughs must be placed approximately 50 cm above a concrete slab and as far as possible from the feeding troughs. Contamination of water with feed still stuck on lambs' mouths is one of the biggest problems in this regard. It is also recommended that water troughs be cleaned more than once a day.

Dr. Jasper Coetzee recommends that one ball valve pig-type water trough (150 to 200 mm diameter) is sufficient for 50 sheep. If the water pressure is high, such a trough can even handle up to 100 sheep.

SHADE

It is important that lambs have enough shade during hot weather, as well as shelter during cold and wet weather. When it gets warmer than 24°C, 0.5 to 1.0 m² of shade per lamb is requisite. According to Dr. Jasper Coetzee, it is not uncommon for ADG to decrease by 30 to 50 percent during severe weather conditions.

GENERAL UREA WARNING

All rations containing urea must have a label with a urea warning on the bag. A general urea warning is as follows:

This feed contains feed-grade urea and must, therefore, be mixed and fed strictly according to the directions for use:

- Vinegar is an effective remedy for NPN poisoning. Mix with equal part water. Dose half a bottle per calf or large sheep, or two to four bottles per head of cattle (1 bottle = 750 ml).
- Protect feed from rain. NPN is soluble in water and animals that drink such a solution can be poisoned.
- Do not use this feed indiscriminately with other NPN-containing feeds. Consult a nutritionist in this regard.
- Mix this concentrate thoroughly with the prescribed ingredients.
- Sufficient grazing and/or roughage must be available at all times.

Many of the above warnings apply especially to the use of lick supplements. However, there is information that also applies to the feeding of lambs in a feedlot.

(Note: This article is based on internal Feedtek knowledge and information, as well as publications by Dr Jasper Coetzee, Dr Willie Smith and Dr Vlok Ferreira)