

Nutritional Management of the Calf after Weaning

The first 30-45 days after a calf is weaned is perhaps the most stressful period of its life. Good performance and health during this time can set the stage for an efficient and profitable feedout, or a long and productive life in the cow herd. On the other hand, most of the sickness and death loss due to respiratory disease happens at this time. Respiratory disease affects one in 7 feedlot placements and is the leading cause of death loss. Recovered cattle also gain more slowly and have lower value carcasses than healthy cattle. Also, digestive upsets that occur here may show up as founder, liver abscesses and other side effects later on. Cattle that are fed too conservatively at this stage may pass up the most potentially efficient period of their life and add extra days on feed, and cost of gain. A few simple considerations will help ease this transition.

Feed selection.

Many times calves are introduced to new feeds for the first time at weaning. Not only is mothers' milk and grass the primary feeds that the calves are accustomed to; the rumen bacteria are adapted to them as well. It takes 1-2 weeks for the rumen microbial population to adapt to new feedstuffs and the introduction of grain requires a major shift. Start out with feeds that the calves are accustomed to. If the calves have been creep fed, the feeds used in the creep should be part of their grain mix at least for the first few days. Calves are adapted to grass; so long stem hay for the first 3-7 days is a normal recommendation.

Calves usually prefer a dry grain mix at first, but will quickly adapt to high moisture feeds, including corn silage over a 1-2 week period. We have successfully started calves on many different feedstuffs including corn gluten feed, soyhulls, corn silage, green chop and haylage. In 10 years of starting trials at the ISU Rhodes Research Farm, the following are just a few of the things we learned about starting rations:

- Corn gluten feed adds energy and protein without contributing starch.
- Soyhulls also add fiber, but not roughage.
- Big bales reduce performance, but cattle compensate if placed on a TMR.
- Whole corn/alfalfa is an acceptable starting ration
- Calves can be started on corn silage, but a 2 week adaptation is best.
- Complete commercial pellets can work, but must be managed.

The important thing is to allow time for the calves to develop an appetite for new feeds, and the rumen bacteria to adapt to the new feeds. The feed mix should meet the nutritional requirements of the calves too. The following are the results of 2 very recent studies at Purdue University that evaluate different post-weaning feeding programs.

Table 1. Influence of Post Weaning Feeding Regime on Performance and Value of Beef Calves

	Grass Legume Hay	
	5.15 lb. corn .85 lb. SBM	4 lb. corn 2 lb. CSS
Wean Weight	580	577
Arrival Weight	547	546
31-d weight	606	620
Weaning ADG	.81	1.34
Arrival ADG	1.91	2.40
Cost of gain	\$52.44	\$51.38
Breakeven	\$81.81	\$80.99

Hendrix et al (2002). Purdue University Calf Weaning and Heifer Development Trials. CSS=Commercial Calf Starter.

Table 2. Influence of Post Weaning Feeding Regime on Performance and Value of Beef Calves

	Grass Legume Hay			Alfalfa
	5.15 lb. corn .85 lb. SBM	4 lb. corn 2 lb. CSS	6 lb. DCGF	6 lb. corn
Wean Weight	512	511	511	514
35-d Weight	575	580	577	576
ADG	1.80	1.97	1.86	1.78
Cost of Gain	\$50.48	\$58.16	\$48.85	\$60.21
Breakeven	\$80.21	\$81.81	\$80.86	\$82.33

Hendrix et al (2002). Purdue University Calf Weaning and Heifer Development Trials. CSS=Commercial Calf Starter.

These studies demonstrate very well that many feedstuffs can be used for receiving rations. In the first study the ration using a commercial calf starter and the ration using alfalfa hay had the highest costs of gain, due to higher feed costs. However, in the first study the commercial feed was competitive due to better performance. The reason may have been more stress in the first group.

Managing Energy Levels

Feed Intake. Perhaps the most important factor in developing a successful starting program is the level of feed the cattle will consume. If intake is estimated accurately, then a ration sequence or schedule of concentrate increases can be made with more confidence. What affects feed intake? The factors are many, but the following are some of the more important ones:

- 1) Stress and animal health
- 2) Weaned or unweaned
- 3) Age
- 4) Weight
- 5) Previous ration (including creep feed)
- 6) Condition

For example, research at Texas A & M (Table 3) shows that long-hauled highly stressed calves may consume only .5 to 1.5% of their body weight in dry matter daily for the first seven days on feed and 1.5 to 2.5% during the second week.

Table 3. Feed intake of newly arrived calves (% of body weight).

	Healthy	Morbid
1-7 days	1.55 ± .51	.90 ± .75
1-28 days	2.71 ± .50	1.84 ± .66
1-56 days	3.03 ± .43	2.68 ± .68

Hutcheson (TAMU). Seven years of data

On the other hand, research at Iowa State University indicates that less stressed calves may consume 1.5 to 2.5% of their body weight in dry matter the first week on feed. These are calves that were fed on the farm in which they were raised and typically had been creep feed. The only major stress on the calves was weaning, and death loss and sickness were minimal. Yearling cattle that have been backgrounded and fed some grain or silage may be capable of consuming

normal levels of consumption (15 to 20 lb. of dry matter) on arrival. As you can imagine, strategies for starting these extremes will likely be very different.

Methods of Increasing Gain. The conventional wisdom in adapting cattle to high concentrate rations is to do it “gradually”. Given variations in feed intake, a multitude of feedstuffs and differences between one group of cattle and the next, this may not be as simple as it sounds. There are two basic methods of adapting cattle to a high grain ration. The first is the “ration step” method used by many larger lots where 3 to 5 rations of increasing energy or concentrate levels are each fed for 5 to 8 days. The second method is the “increasing grain” method where the amount of grain fed per day is systematically increased. If intake levels are adjusted back at each step as shown in Figure 1, the amount of grain increased each day could be exactly the same as a steadily increasing grain system (Figure 2). The one advantage to the ration step method is that it can be simpler. Ingredient proportions of each ration are already known, so the only major day-to-day management involves adjustments for feed intake and the decision about when to change rations. Increasing grain methods require not only a feel for changes in intake and increases in grain levels, but adjustments in forages and supplements too. This is where the art of starting calves come in.

Effects of Concentrate Levels. Table 4 shows the effect of concentrate levels on performance and health of highly stressed calves. As you can see, the 72% concentrate ration was the most efficient and economical.

Table 4. Comparison of 20, 55 and 72% Concentrate Barley Diets for Stressed Calves.

Item	Concentrate level, %		
	20	55	72
Purchase weight	364	366	364
HEALTH			
% treated	51	62	54
days treated/head	4.4	3.5	4.7
death loss	0	1	0
PERFORMANCE			
daily gain, lb.	1.34	1.72	2.10
feed/gain	6.40	5.22	4.23
Net value of gain/cwt*	\$-.27	\$-.11	\$.11
Cost of gain/cwt*	\$1.42	\$.84	\$.61

Lofgreen-California (1975).

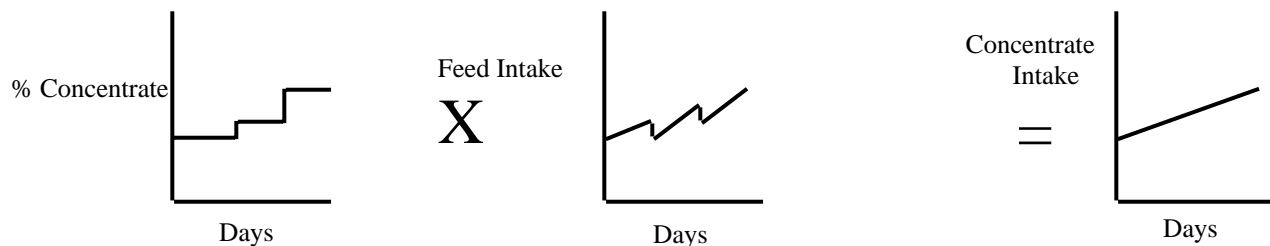


Figure 1. Changes in ration concentrate, feed intake and concentrate intake when using **ration step** method of starting cattle.

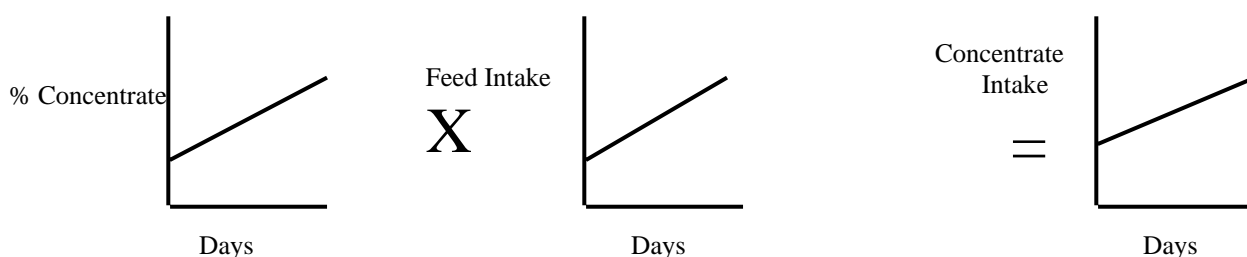


Figure 2. Changes in ration concentrate, feed intake and concentrate intake when using **increasing gain** method of starting cattle.

Table 5 shows the effect on concentrate levels on newly weaned, but not greatly stressed calves from the ISU Rhodes Research Farm. In this study, diarrhea, bloat and other evidence of acidosis occurred in the 75% concentrate ration, indicating that 60% concentrate is preferable.

Table 5. Effect of Energy Level for Starting Calves on Feed.

Item	60% Concentrate		75% Concentrate	
	Milled Silage		Milled Silage	
No. cattle	53	52	50	51
D.M. Intake				
day 1-14	8.8	10.1	8.4	10.3
day 15-28	11.1	11.6	10.0	11.3
day 1-28	10.0	10.8	9.2	10.8
ADG	2.61	2.45	2.23	2.31
DM/Gain	3.38	4.43	4.10	4.73
No. treated (bloat)	---	---	1	6

Loy, ISU (1985).

The differences in these experiments can be explained by the differences in feed consumption. Perhaps acidosis problems would have been minimized in the ISU high concentrate ration if consumption was limited to the levels expected of a highly stressed calf. Limiting intake would require high management including adequate bunk space, more frequent feeding, close observation of sick cattle and ration adjustment based on the number of cattle not eating. The observations of acidosis in the ISU cattle were “marginal” in nature. Had the same ration been fed to backgrounded cattle capable of consuming 15 to 20 lb. of dry matter per day, overload and death may well have been the result.

Developing a Starting Program. There are really three steps to developing a starting program.

- 1) determine expected intake
- 2) determine eventual ration
- 3) determine beginning concentrate levels

Table 6 shows three examples with varying cattle types. In these examples the eventual ration is a 60% concentrate growing ration for the calves and 80% concentrate finishing ration for the yearling. A four week program is selected because it often takes 3 to 4 weeks for the cattle to reach “normal” feed intake. It was assumed that the cattle can tolerate .75% of their body weight

in concentrate as a starting place. This may differ with different management or certain types of cattle. The concentrate is increased gradually and uniformly over the four week period. Anyone who has started cattle knows that it is not always this simple. Weather, sickness, etc. may cause cattle to go “off-feed” and require a backwards step. However, a well thought out plan and close monitoring will aid to quicken the reaction time to any problems.

Table 6. Example Starting Programs for Three Cattle Types.

Averages	400 lb. highly-stressed long-hauled Calves			400 lb. pre-conditioned or low stress calves			800 lb. backgrounded yearlings		
	Conc. lb.	Feed Intake lb.	% Conc.	Conc. lb.	Feed Intake lb.	% Conc.	Conc. lb.	Feed Intake lb.	% Conc.
Week 1	3	4	75	4	8	60	6	15	40
Week 2	5.5	8	75	6.6	11	60	10	17	60
Week 3	7	10	75	7.5	12.5	60	14	20	70
Week 4	8.5	12	75	8.4	14	60	17	23	74
Final Ration	8.5	14	60	8.5	14	60	20	25	80

Monitor and Manage Feedbunks. Newly weaned calves should have enough feedbunk space so all the calves can eat at one time (18-24”). Many different feeding systems have been used to successfully get cattle started on feed. A total mixed ration is the easiest to control and monitor. This ration can be put together with a host of grains and roughages and can be fed in addition to the long stem hay for the first few days. Many feeders find that slightly limiting intake and keeping calves somewhat aggressive allows for easier detection and pulling of sick calves. One approach to managing feed intake is to feed 2% of the bodyweight as long stem hay on day one. Introduce about 1% of their body weight on a dry matter basis of the complete ration on the second day and begin phasing out the long hay. You can increase the intake of the calves about a pound of feed every 2-3 days. Each group of calves is different, and health problems may cause some setbacks, but on a normal healthy group of calves they should be consuming 2.5 to 3.0 % of their body weight by 3-4 weeks on feed. The calves are then ready to be stepped up on grain if that is the system.

Meet nutrient requirements. Complete starting rations or TMRs should be formulated to provide enough energy for sufficient growth, but enough forage to aid in the transition from forage to grain. For normally weaned, well-managed calves, a ration that is 50-60% concentrate and 47-50 Mcal/cwt. N_Eg is about ideal. For early weaned, high stress or high-risk calves, a 65-75 % concentrate will ensure higher energy intake at lower feed consumption. Protein should be 13-13.5 % to as high as 14.5% for early-weaned 300-500 lb. calves. Newly weaned calves cannot utilize urea as effectively as bigger cattle, so a natural protein source or a supplement that includes a high bypass source with urea is preferred. Additional minerals including calcium, phosphorous and potassium may be required depending on the feedstuffs fed. Vitamins A, D and E should be part of the supplement. Trace minerals including zinc, copper and selenium may be needed in higher levels than the requirement to help fight disease. The National Research Council has published requirement specifically for the stressed calf. They are shown in table 7.

Table 7. Suggested Nutrient Concentrations for Stressed Calves (dry matter basis)

Nutrient	Unit	Suggested range
Dry matter	%	80-85
Crude Protein	%	12.5-14.5
Net energy for maintenance	MCal/lb.	.59-.73
Net energy for gain	MCal/lb.	.36-.41
Calcium	%	.6-.8
Phosphorous	%	.4-.5
Potassium	%	1.2-1.4
Magnesium	%	.2-.3
Sodium	%	.2-.3
Copper	ppm	10-15
Iron	ppm	100-200
Manganese	ppm	40-70
Zinc	ppm	75-100
Cobalt	ppm	.1-.2
Selenium	ppm	.1-.2
Iodine	ppm	.3-.6
Vitamin A	IU/lb	1800-2700
Vitamin E	IU/day	180-230

NRC (1996)

Feed Additives. Work with your nutritionist or veterinarian to determine the right feed additive based on the history of your farm. Coccidiostats or broad-spectrum antibiotics are common in starting rations. If these are not included, use an ionophore such as Bovatec, Rumensin or Cattlyst to improve feed efficiency.