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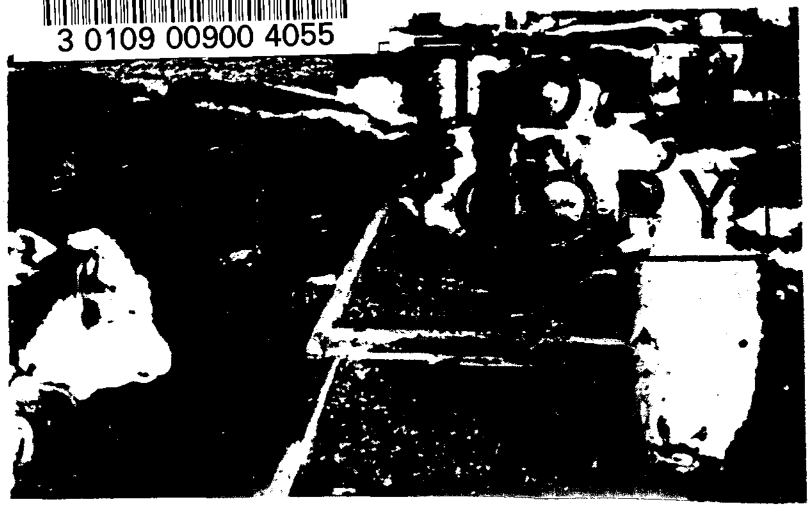
BACKGROUNDING FEEDER CALVES



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North Dakota produces about 1,000,000 head of calves each year (the 1982 calf crop was estimated at 1,070,000 head). About 40 percent of the year's calf crop is sold in the fall, with most of these calves being shipped out of state. While some of these calves will be herd replacements, most of the remaining will be backgrounded.

What Is Backgrounding?

Backgrounding is a term used to describe a phase of growing calves being prepared for feedlot placement. As compared to wintering programs, backgrounding emphasizes a faster rate of gain, with relatively more grain and less roughage.

An example of a typical backgrounding operation would be to feed 400 to 500 pound steer calves to a weight of 600 to 700 pounds. If the feeding period was to be about 120 days, a ration and management program that produces an average daily gain of 1.7 pounds would provide the desired sales weight.

Advantages of Backgrounded Feeder Calves

There are a number of factors that can give the North Dakota cow-calf operator a competitive advantage in backgrounding as an alternative to fall sales. Some of the advantages are:

- Provide a market for homegrown grain and roughage that might otherwise have little market value.

- Calves about 400 pounds are efficient converters of good quality feeds.

- Avoid the stress and resulting health problems associated with shipping of young calves through the marketing system. Because of the potential death loss and health problems associated with handling and shipping of young calves, the cow herd owner has an advantage over those who purchase their calves through the marketing system.

- Avoids the seasonal fall market glut and targets sales during seasonally strong feeder prices.

- Provides more flexibility to spread marketings and choose among potentially profitable alternatives.

- Allows better use of performance records in selecting heifer replacements.

- Provides additional flexibility for marketing heifers either as feeders or as herd replacements.

Profit Potential

Regardless of the number of advantages, the profit potential of alternatives should still be evaluated **prior** to starting a backgrounding program. Budgeting can aid decision-making by indicating the potential for increasing or decreasing net returns through backgrounding.

A budget can be used to show the breakeven sales price for each alternative being considered. The breakeven price is the projected sales price necessary to cover the cost of a feeding program. Breakeven price is determined by dividing the total cost of production by final sales weight:

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$$\text{Breakeven sale price} = \frac{\text{initial calf value} + \text{costs of feeding}}{\text{final selling weight of calf}}$$

For the cow-calf operator considering backgrounding, the breakeven price is the price necessary at the end of the backgrounding period to be at least as well off as selling the calf in the fall.

The following example shows the breakeven calculation on a backgrounding program for a 425 pound calf valued at $68 per hundredweight in the fall ($289 per head). Sales weight after shrinkage is 616 pounds and cost of feeding is $94.*

$$\text{Breakeven} = \frac{\text{calf value} + \text{cost of feeding}}{\text{sales weight}}$$

$$= \frac{\$289 + 94}{616}$$

$$= \frac{\$383}{616}$$

$$= \$0.6218 \text{ per pound}$$
or $62.18 per hundredweight

In this case, the feeder will have to sell for $62.18 per cwt. after the backgrounding program to avoid decreasing net returns. At this point it becomes a bit easier to assess the potential for gain versus the risk of loss. Current outlook information can help form an opinion on future prices.

Feeding Alternatives

In general, purchased calves should be fed long enough to gain at least 150 pounds on a backgrounding program. Initial costs of gain tend to be relatively high as calves recover from the stress of movement and handling, a new environment and, most likely, a new ration.

Most feeder cattle will not be placed on a full-feed ration until they reach the 700-800 pound range. And, many feedlots specialize in finishing catle from the full-feed stage only. With this in mind, backgrounding to the full-feed weight range should be **evaluated** as an alternative.

Feeder cattle in the 800-1000 pound range are often considered "two-way" cattle; they could either be marketed for slaughter or further finished. Two-way cattle can provide a useful option for those operators who are prepared to go to final finish if conditions suggest that might be a more profitable alternative. Custom feedlots in North Dakota and nearby states provide additional flexibility in choosing among alternatives.

*See budget example on back page.

FEED REQUIREMENTS

Planning the ration is very important, because the ration largely determines the gains made and represents most of the costs.

Table 1 or figure 1 shows how many pounds of ration (50 concentrate/50 roughage) or TDN (total digestible nutrients) it takes each day to maintain a steer calf with **no gain** or to produce **various amounts of gain.** Faster gains are more efficient and usually more economical because a smaller proportion of total feed consumed is used for maintenance. With faster gains, the same total gain can be put on a calf in less time, reducing interest, labor and yardage costs due to the shorter feeding time.

Energy (TDN) is the most important nutrient in producing gains. Once maintenance needs have been met, gains are largely proportional to additional feed consumed.

Table 1. DAILY T.D.N. NEEDS* OF STEER CALVES TO MAKE VARIOUS RATES OF GAIN**

	Weight of Steer Calf, lbs.							
Daily Gain Desired, lbs.	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1000**
1.0	4.6	5.7	6.75	7.75	8.7	9.6	10.5	11.35
1.2	4.95	6.15	7.3	8.35	9.35	10.35	11.3	12.25
1.4	5.3	6.6	7.8	9.0	10.05	11.1	12.15	13.15
1.6	5.7	7.1	8.4	9.6	10.75	11.9	13.0	14.1
1.8	6.1	7.55	8.9	10.25	11.5	12..7	13.9	15.05
2.0	6.5	8.0	9.5	10.9	12.25	13.55	14.8	16.0
2.2	6.9	8.5	10.1	11.55	13.0	14.35	15.7	17.0
2.4	7.35	9.05	10.7	12.25	13.75	15.2	16.6	18.0
2.6	7.75	9.55	11.3	12.9	14.5	16.05	17.55	19.0

*Assumes ration contains 50% concentrates, 50% roughage on air-dry basis. When ration contains markedly higher or lower proportion of concentrate feeds, adjustment should be made in these amounts of T.D.N. needed daily by using the appropriate multiplicative adjustment factor (page 4). This will correct the above values for the value of T.D.N. from roughages for adding gains as comapred to T.D.N. from concentrate feeds.

**Extended severe cold weather and wind chill stress can be expected to result in reduced live weight gains obtained from a given constant feed intake. This reduced performance is due to a combination of increased maintenance requirements, reduced dry matter intake from rations containing excessive moisture, reduced digestion efficiency by calves, and perhaps other reasons. Some adjustment to maintain gain rate can be obtained by reducing roughage intake while increasing allowance of concentrates. In any event, growing animals will tend to compensate or "catch up" in weight gains once the weather moderates, provided their ration is of such quality and quantity as to permit compensatory gains.

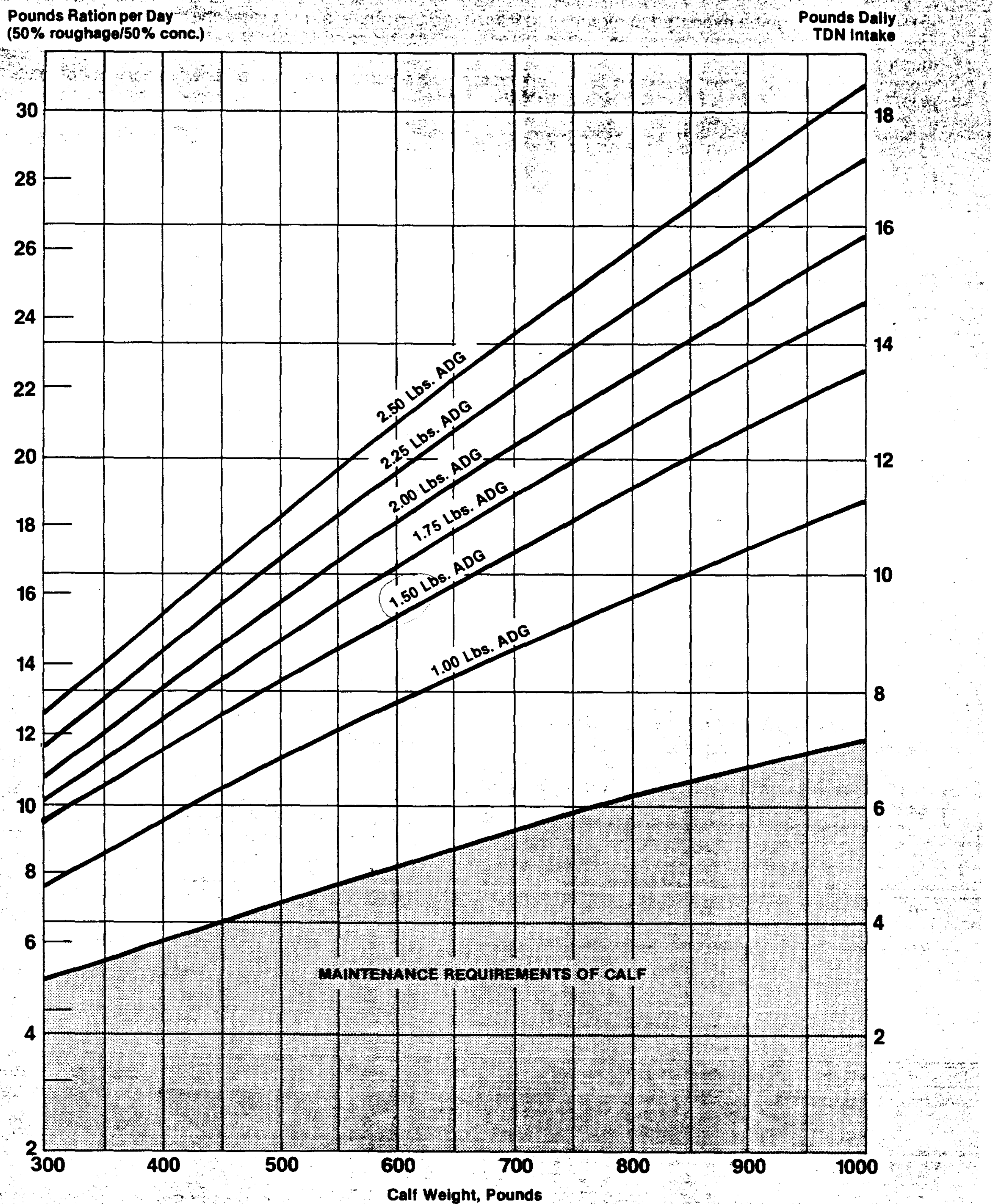


Figure 1. Lbs. of Ration (50% Conc./50% Roughage) or Lbs. of TDN Needed for Various Weight Gains in Steer Calves. The scale at the left side of Figure 1 indicates pounds per day of a 60% TDN ration (approximately 50% concentrates, 50% roughage) while the scale at the right side of Figure 1 indicates the pounds of Total Digestible Nutrients needed per day for various rates of gain.

Heifer calves can be expected to require 4 to 9 percent more TDN to make the same amount of gain indicated in Table 1 or figure 1 for steers. Heifers store more calories as fat than steers or bulls, so more feed energy or TDN is required per pound of gain.

When calves are being fed to slaughter weights under single ownership, the most rapid gains are usually the most profitable. Where animals are being grown to sell to other parties for final finishing, however, maximum gains may not be most profitable. Maximum gains will frequently result in a greateer degree of fattening than is desired by the feeder, who will tend to discount the price on excessively fleshy calves. There is also a trend for lowered prices with increased calf weights. However, when feeding larger framed calves it is usually desirable to feed for maximum gains even during the backgrounding period.

RATE OF GAIN FOR BACKGROUNDING

Calves should be fed to gain a minimum of 1.5 pounds per day. A range of 1.5 to 2 pounds per day gain is a desirable backgrounding range for conventional-sized calves. Larger-framed calves can be fed to gain 2 pounds or more without becoming excessively fat and depressing their selling price.

Heifer calves ordinarily gain approximately 10 percent slower than steer calves fed on the same ration.

ENERGY (TDN) FROM ROUGHAGES AND CONCENTRATES

TDN from roughages is less efficient for adding gains than the same weight of TDN from a high-concentrate ration. Some adjusment then becomes appropriate if ration composition is markedly different from the 50 roughage:50 concentrate mixture assumed in developing Table 1 or Figure 1 (Figure 1 was developed from the California Net Energy system). Using the multiplicative factors below to adjust for high-roughage or high-concentrate rations will aid in accurately projecting amounts of ration needed daily to produce the desired rates of gain.

Multiplicative Factors for Use with Table 1 or Figure 1 to Adjust for Concentrate:Roughage Ratio.

Percent Concentrates	Percent Roughage	Factor
20	80	×1.13
25	75	×1.10
30	70	×1.08
34	66	×1.06
40	60	×1.03
50	50	×1.00
60	40	× .95
66	34	× .93
75	25	× .91
80	20	× .90

Heifers store more energy as fat than steers in each pound of gain they make, with the difference increasing with faster rates of gain. Consequently, heifers require more feed per pound of gain than steers. This difference can be closely estimated by multiplying TDN needs as read from Table 1 and Figure 1 by the following multiplicative factor, depending upon gain rate of the heifers:

Daily Gain, lbs.	Factor for Adjusting Steer Energy Needs to Those of Heifers
1.0	×1.04
1.25	1.05
1.5	1.06
1.75	1.07
2.0	1.08
2.25	1.09

Heifers will typically consume 2 to 4 percent more feed than their half-sib steers per unit of body weight.

Use these adjustment charts to calculate the "Daily TDN Needed" value obtained from Table 1 or Figure 1 and to determine daily requirements for heifers (from Table 1 or Figure 1 based on steer needs) as follows:

Example: Determine daily TDN needed to put daily gain of 1.3 pounds on heifer calves weighing 500 pounds. The intended ration is planned to contain about 40 percent concentrates and 60 percent roughage feeds.

From Table 1 or Figure 1 we see that multiplying the amount of TDN needed to put 1.3 pounds daily on a 500 pound steer calf times 1.06 will estimate the amount of TDN needed (from a 50 roughage:50 concentrate ration) to put the 1.3 pounds gain on a heifer calf.

7.8 lbs TDN × 1.06 = 8.27 lbs TDN.

Another adjustment is appropriate since our planned ration calls for 40 percent concentrate feeds, 60 percent roughage, instead of the 1:1 ratio assumed in Table 1 and Figure 1:

8.27 lbs TDN × 1.03 = 8.52 lbs TDN needed by heifer calves averaging 500 lbs. to gain 1.3 lbs daily on a ration containing 60 percent roughage (roughage-to-concentrate ration of 1.5:1). (From Table 1 or Figure 1).

To see if such feed intake is feasible or realistic, we can calculate how much ration per day the heifers must eat to consume the 8.52 lbs of TDN. First the TDN content of the rations needs to be calculated, as follows:

60 × .50 TDN in good hay	30.0
39 × .73 TDN in oats-barley mix	28.5
1% salt and minerals, no TDN	0.0
	Total: 58.5% TDN in ration

Since our ration will contain approximately 58.5 percent TDN and the heifers will need to consume 8.5 pounds of TDN daily, we can calculate the quantity of ration they must consume daily to make this gain, as follows:

$$\frac{\text{8.52 lbs TDN needed}}{\text{.585 (TDN level of ration)}} = \text{14.56 lbs ration needed daily}$$

Calculations tell us the heifers will need to consume about 14½ pounds of the 40:60 ration daily to make the 1.3 pounds daily gain. We can quickly check Table 3 to see if such an intake is realistic for our heifers. (This further calculates to about 2.9 percent of calf body weight daily.)

Considering that heifers have a slightly larger appetite than steers and can be expected to consume slightly more feed relative to their size than steers, it appears realistic to assume our heifers will be able to consume enough feed to furnish the nutrients needed for 1.3 pounds of gain per day.

Table 3 can be used together with calculated energy level of any calf growing ration to determine whether the calf is likely to be able to consume enough of any planned ration to give the gains sought.

Bulk and stomach limitations are likely to prevent sufficient ration intake for satisfactory backgrounding gains on rations containing over 55 to 60 percent roughage.

Table 2. Suggested Total Protein Requirements for Maintenance and Gain of Beef Cattle[1]

Lb. Daily	Body Weight (lb.)							
Gain	300	400	500	600	700	800	900	1000
	Required Total Protein, Lb./head/day							
0.5	0.64	0.73	0.82	0.89	0.97	1.04	1.12	1.18
0.6	0.69	0.78	0.87	0.94	1.02	1.09	1.17	1.23
0.7	0.75	0.84	0.93	1.00	1.08	1.15	1.23	1.29
0.8	0.80	0.89	0.98	1.05	1.13	1.20	1.28	1.34
0.9	0.86	0.95	1.04	1.11	1.19	1.26	1.34	1.40
1.0	0.91	1.00	1.09	1.16	1.24	1.31	1.39	1.45
1.1	0.97	1.06	1.15	1.22	1.30	1.37	1.45	1.51
1.2	1.03	1.12	1.21	1.28	1.36	1.43	1.51	1.57
1.3	1.08	1.17	1.26	1.33	1.41	1.48	1.56	1.62
1.4	1.13	1.22	1.31	1.38	1.46	1.53	1.61	1.67
1.5	1.19	1.28	1.37	1.44	1.52	1.59	1.67	1.73
1.6	1.25	1.34	1.43	1.50	1.58	1.65	1.73	1.79
1.7	1.30	1.39	1.48	1.55	1.63	1.70	1.78	1.84
1.8	1.36	1.45	1.54	1.61	1.69	1.76	1.84	1.90
1.9	1.41	1.50	1.59	1.66	1.74	1.81	1.89	1.95
2.0	1.46	1.55	1.64	1.71	1.79	1.86	1.94	2.00
2.1	1.52	1.61	1.70	1.77	1.85	1.92	2.00	2.06
2.2	1.57	1.66	1.75	1.82	1.90	1.97	2.05	2.11
2.3	1.63	1.72	1.81	1.88	1.96	2.03	2.11	2.17
2.4	1.68	1.77	1.86	1.93	2.01	2.08	2.16	2.22
2.5	1.74	1.83	1.92	1.99	2.07	2.14	2.22	2.28
2.6	1.79	1.88	1.97	2.04	2.12	2.19	2.27	2.33
2.7	1.85	1.94	2.03	2.10	2.18	2.25	2.33	2.39
2.8	1.90	1.99	2.08	2.15	2.23	2.30	2.38	2.44
2.9	1.96	2.05	2.14	2.21	2.29	2.36	2.44	2.50
3.0	2.01	2.10	2.19	2.26	2.34	2.41	2.49	2.55
3.1	2.07	2.16	2.25	2.32	2.40	2.47	2.55	2.61
3.2	2.12	2.21	2.30	2.37	2.45	2.52	2.60	2.66
3.3	2.18	2.27	2.36	2.43	2.51	2.58	2.66	2.72
3.4	2.23	2.32	2.41	2.48	2.56	2.63	2.71	2.77
3.5	2.28	2.37	2.46	2.53	2.61	2.68	2.76	2.82

[1]Adapted from Great Plains Extension Fact Sheet GPE-1100.

Table 3. Expected Feed Intake of Calves Fed to Appetite on Rations of Approximately 50 Percent Roughage, 50 Percent Concentrates.

Body Weight	Smaller-framed Earlier-maturing Types		Medium-framed		Larger-framed Slower-maturing Types	
	% of Body Wt.	Lbs. of Ration	%	Lbs.	%	Lbs.
400 Lbs.	2.7	11	3.0	12	3.3	13
500	2.6	13	2.8	14	3.1	15½
600	2.5	15	2.7	16	3.0	18
700	2.4	16½	2.6	18	2.9	20
800	2.25	18	2.5	20	2.7	22
900	2.1	19	2.4	21½	2.6	23½
1000	2.0	20	2.25	22½	2.5	25
1100	1.8	20	2.1	23	2.4	26

PROTEIN REQUIREMENTS

Growing beef calves weighing under 450 pounds should have a minimum of 12 percent crude protein (air-dry basis) in their rations. Rations having 11.5 percent protein should be adequate for calves weighing 450 to 550 pounds, and 11 percent crude protein rations should be ample for calves weighing over 550 pounds. Providing higher levels of protein is unlikely to improve gains or profitability. However, large-framed calves being fed for higher rates of gain (in excess of 2 pounds per day) may benefit from slightly higher protein rations. Protein percentage of the ration should be increased to parallel the energy level.

If legume hays, legume-grass hays, grass hays cut early and stored in excellent condition and grains (except corn) constitute the entire ration, the protein level will usually be adequate, and performance will not be enhanced by furnishing additional protein. Other feeds such as corn, corn silage, and medium quality hays are lower in protein content. Rations containing substantial amounts of these feeds may require protein supplementation of optimum results.

Specific requirements for amount of protein needed per day are presented in Table 2.

MINERAL NEEDS

A ration of approximately half concentrates and half good quality roughages will usually be adequate in both the major minerals, calcium and phosphorus.

Feed grains are good sources of phosphorus, and high quality forages are excellent sources of calcium. Lower quality roughages are usually adequate in calcium but short in phosphorus. When fed with a substantial amount of grain, the entire ration will usually be adequate in phosphorus as well as in calcium.

Salt will frequently be the only mineral needed. Salt can either be fed free choice or mixed into the complete ration at levels of .33 percent of the ration or slightly higher.

Others may prefer to offer a single mineral mixture free choice in a separate mineral feeder. Examples of mixtures are half and half dicalcium phosphate and trace mineral salt or half and half steamed bone meal and trace mineral salt or a commercial mineral mixture with about 8 to 12 percent phosphorus.

Depending upon quality of roughage, fattening-type rations containing upwards of 80 percent grain are usually short in calcium. In this instance, offer low phosphorus, high calcium mineral with about 6 percent phosphorus and 30 percent calcium.

GOOD QUALITY HAY IMPORTANT

High quality hays furnish more nutrients per pound and are also consumed in greater quantity than lower quality hays. Due to variation in hay quality and in animals, it is impossible to suggest exact grain levels needed to produce a given rate of gain. Where hay quality is mediocre, more grain must be fed to assure a desired rate of gain. Where hay quality is excellent, a given rate of gain can be obtained using less concentrate in the ration.

AVOID BLOAT

Combinations of barley and alfalfa as the principal ration ingredients can provoke bloat problems. Barley-alfalfa combinations with either small or large amounts of alfalfa, under 30 percent or over 70 percent, seem to be more bloat free than rations that contain about 50:50 alfalfa and barley. An exception is where corn silage is included in the ration. Corn silage in moderate amounts ordinarily prevents bloat. Some genetic lines of cattle seem to be easy bloaters also.

SILAGE

Amounts of wet silage fed should be limited, as calves fed rations consisting primarily of wet silage often will not consume enough dry matter to make desired gains. When corn silage contains less than 70 percent moisture (more than 30 percent dry matter), a minimum of 1 pound of concentrate feeds per hundred pounds of calf weight, with silage fed to appetite, should produce satisfactory gains. If silage made from any crop other than corn is fed, or if corn silage has more than 70 percent moisture, the grain intake should be at least 1.25 percent of body weight. (Supplements can be included in the concentrate feeds referred to as "grain.")

During the coldest parts of the winter, it will be desirable to reduce silage intake and increase the dry feed, both hay and grain, of calves fed outside. Limiting silage intake to 10 pounds daily during the coldest weather should help to avoid poor gains often associated with calves fed high-silage rations in bitter cold weather. Higher levels of silage can be fed more advantageously during the milder fall and spring months.

SELF FEEDING RATIONS

Feeding complete rations of ground hay and grain to growing calves has several advantages, including saving of labor, avoiding unequal consumption of grain, reducing digestive upsets, assuring maximum feed intake, and others.

Grinding the roughage portion of the ration usually results in greater roughage intake than with long hay. The Dickinson Experiment Station has used ground, mixed rations of 50 percent barley and 50 percent hay and obtained gains of over 2 pounds per day from 450 pounds to slaughter weight. Slightly higher gains have been obtained where the grain level has been gradually increased to 70 to 80 percent of the ground ration.

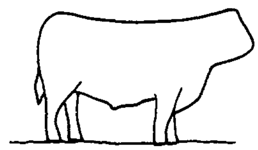
The energy concentration of mixed rations for self-feeding depends on the proportion of concentrate to roughage, quality of roughage, kind of grain fed, and test weight of the grain fed. In general, such rations for backgrounding calves should contain at least 40 to 45 percent concentrates by weight, depending on the kind of grain and quality of hay fed.

Daily feed intake, energy intake, and calf gains can be expected to increase as the ration level increases to approximately 63 percent TDN on an as-fed basis (roughly 55 percent grain, 45 percent hay). Further increasing the energy (TDN) level by raising the proportion of grain in the self-fed ration may result in increased gains for certain groups of calves, particularly those having inherent ability to make rapid gains. However, such rapid gains may not be most advantageous where calves are being grown for sale as feeders, to be finished by others.

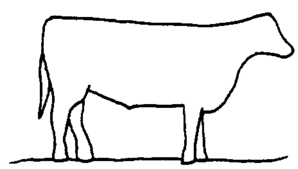
An upper level of 65 to 70 percent grain (by weight) in self-fed rations should give gains as rapid as are desirable for backgrounding programs. Large-type calves could be self-fed ground rations containing up to 75-80 percent concentrate feeds if the roughage consists in part of low-grade roughages or if at least one-third of the grain is oats.

BODY TYPE AND SKELETAL FRAME

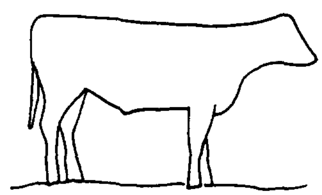
The ability of cattle to grow and finish is largely determined by body type. Representative body types are small, medium and large as shown by the following drawings.



Genetically smaller-framed, shorter-legged cattle have a tendency to mature at lighter weights than desired. These lack ability to make high rates of gain and begin to slow in their growth rate at light weights and young ages. Small-framed cattle are expected to attain proper degree of finish for slaughter at weights of 1,000 pounds and under for steers and 850 pounds for heifers.



Medium body type is represented by modern Angus, Hereford, and Shorthorn types, plus medium type Continental breeds and crosses. Medium-framed cattle are expected to reach a slaughter degree of finish at weights of 1,000 to 1,200 pounds for steers and 850 to 1,000 pounds for heifers.



Exceptionally long, tall, large-framed, later-maturing cattle having high inherent gaining capacity that tend to grow bone and muscle rather than deposit fat at a young age include the large Continental breeds plus Holstein, Brown Swiss and high-percentage crosses of these breeds. Large-framed cattle usually will need to be fed to 1,200 pounds and up for steers and 1,000 pounds and up for heifers.

SMALL-TYPE CALVES

Smaller-type calves tend to consume less feed relative to their size, while genetically faster-gaining calves tend to consume more feed relative to their size than average beef calves. Smaller-type calves will be older at any given weight than average or larger-type calves, explaining the lowered feed intake per unit of body weight. Genetically smaller calves tend to begin slowing in their growth pattern earlier, while genetically larger cattle tend to keep growing rapidly to a given weight. The level of feed intake will reflect growth rate rather closely. Smaller-type cattle generally have the ability to make Choice Grade more easily because they marble at a younger age and lighter weights.

FAST GAINING CALVES

Genetically larger calves capable of above-average gains should be fed rations higher in energy and protein concentration than calves of conventional beef breeding. Large-framed, slower-maturing cattle on rations containing 50 percent or less grain tend to grow rather than finish. On such moderate energy rations, they will probaly not reach the desired grade of Low Choice until they weigh 1200 pounds or more, which results in a heavy carcass that may be discounted. Therefore, a higher-energy ration is appropriate for larger-type calves. Large-type calves backgrounded on too low an energy plane may be unable to finish quickly enough, even though later placed on high-concentrate finishing rations.

Larger-framed breeds of cattle including Continental breeds, dairy breeds, crosses and some large-framed British breed cattle will need more concentrate feeds at an earlier age to permit them to make the choice grade at 1100 to 1200 pounds.

MAXIMUM FEED INTAKE

Table 3 shows the approximate maximum level of air-dry feed that groups of calves will consume over a period of time. Many groups of calves will not consume quite this much feed. By comparing the amounts of feeds used daily and TDN content of these feeds with Table 1 or Figure 1, it can be determined whether or not a ration can provide enough TDN to produce the desired gain. If it does not, the proportion of grain should be increased.

FEEDING LEVELS AND RATION SUGGESTIONS

The amount of grain indicated per day for "medium" energy rations (Table 5) is the minimum suggested for efficient backgrounding gains. Using less grain per day is likely to give gains under 1.5 pounds daily, which are less likely to be most profitable. Amount of hay or roughage indicated is near the maximum that calves are likely to eat with grain feeding levels suggested. Table 3 shows maximum expected amounts of air-dry feeds that calves of different weight are likely to eat daily, acording to type and breeding.

Increasing the daily level of grain feeding while decreasing roughage normally should increase grain rate and improve efficiency of gain. Rations might range in composition from those listed under "medium" energy to those listed as "high" energy. The roughage levels suggested for "high' 'energy rations are minimums considered necessary to keep calves on feed and gaining steadily, and to avoid digestive problems associated with excess consumption of grain. Combinations of feeds within the ranges suggested should ordinarily give gains of 1.5 pounds daily or more, with gains increasing as the proportion of concentrate feeds in the ration is increased.

For large-type, big-framed, fast-gaining calves, rations similar to those suggested in the "high" energy column are more appropriate than rations similar to those in the "medium" energy columns.

Table 4 presents some feeding level suggestions with sample rations (Table 5) for calves of different weights. In situations when grain is priced very high relative to roughage feeds, it may be feasible and most economical to use lower concentrate levels than suggested even for "medium" energy rations. When such lower energy rations are fed, gains will be slower and feed conversion less efficient due to the larger proportion of total feed intake used for maintenance purposes. An additional consideration is that as daily gains become smaller, the actual cost and relative importance of non-feed items increase per hundredweight of calf gain produced. Thus, economies gained from use of less concentrate feed per day may be offset by the greater cost of non-feed items per hundredweight of calf gain produced.

Consumption of rougages fed can vary from amounts indicated due to **quality** of forage, dry matter or moisture content, type of preparation, weather, cleanliness and freshnes of feed, inherited growth potential, and previous treatment of calves. If the grain fed consists of corn or corn and cob meal instead of higher-protein grains, about ½ pound more of 36 percent supplement wil be needed daily than suggested. Laboratory chemical analysis of feeds could confirm the need for more, less, or the indicated amount of protein supplement. Oats can be fed whole to calves up to 600 pounds with no loss of utilization. Other grains should be cracked, rolled, or coarsely ground.

Table 4. Thumb Rules for Levels of Feeding

Kind of Feedstuff	Average Type Cattle	Large-type, Slow-Maturing Cattle
Grain	At least 1¼% of Body Weight	Approximately 2% of body weight, but at least 1.75% of B.W.
Hay, excellent	Feed to appetite, but not less than 3 lbs. per day.	At least ½ percent of B.W., but not less than 2½ lbs. daily.
Supplement	None needed, protein adequate with good hay, except with corn grain.	None needed.
Grain	At least 1¼% of B.W.	About 2% of B.W. but at least 1.75% of B.W.
Medium quality hay	Feed to appetite, but not less than 3 lbs. per day	At least ½ percent of B.W., but not less than 2½ lbs. daily
Supplement, 36% protein	½ lb. should be adequate	½ lb. should be adequate
Grain	At least 1¼% of B.W.	About 2% of B.W. but at least 1.75% of B.W.
Hay, alfalfa or alfalfa/brome	Approximately 3 lbs. daily	At least 2 lbs. daily
Silage, over 70% moisture	At least 8 lbs. Feed to appetite when grain is limited or hand-fed.	At least 8 lbs. daily, but not over 2½ lbs. silage per 100 lbs. B.W.
Supplement, 36% protein	½ lb. daily should be adequate	½ lb. daily should be adequate
Grain	At least 1.0% of B.W.	At least 1½% of B.W.
Hay, alfalfa or alfalfa/brome	About 3 lbs. daily	At least 2 lbs. daily
Good corn silage, high dry matter, 65% moisture	At least 8 lbs. Feed to appeetite when grain and hay are limit-fed.	At least 8 lbs. daily. Not over 2½ lbs. silage per 100 lbs. B.W.
Supplement, 36% protein	0.75 lb. daily should be adequate	0.75 lb. daily should be adequate

Table 5. Sample Rations — Pounds offered per day.

	Kind of Feed Energy Level	400 Medium		400 High	500 Medium		500 High	600 Medium		600 High	700 Medium		700 high
RATION I	GRAIN	5	to	9 lbs.	6½	to	11 lbs.	7½	to	13 lbs.	8.75	to	14 lbs.
	HAY	7	to	2½ lbs.	7.75	to	2½ lbs.	8.75	to	3 lbs.	9	to	3½ lbs.
	SUPPLEMENT	None		None	None		None	None		None	None		None
RATION II	GRAIN	4½	to	8	5.75	to	10.	7	to	12	8¼	o	14
	HAY	6½	to	2½	7	to	2½	8	to	3	9	to	3½
	SUPPLEMENT	½		½	½		½	½		½	½		½
RATION III	GRAIN	4½	to	8	5.75	to	9	7	to	11	8¼	to	13
	HAY	3	to	2	3	to	2	3	to	2	3	to	2
	SILAGE	15	to	5	18	to	8	21	to	8	24	to	8
	SUPPLEMENT	½		½	½		½	½		½	½		½
RATION IV	GRAIN	3¼	to	7	4¼	to	8	5¼	to	10	6¼	to	12
	HAY	3	to	2	3	to	2	3	to	2	3	to	2
	SILAGE	14	to	5	17	to	8	20	to	8	22	to	8
	SUPPLEMENT	.75		.75	.75		.75	.75		.75	.75		.75

(BACKGROUNDING)

CATTLE—FEEDING WORK SHEET

VARIABLE COSTS

1. Feeder cost 4.25 cwt. pay weight @$68.00 per cwt. — $ 289.00 (1)
2. Feed Cost:

		Quantity	Unit		
Feed 1	barley	22	bu.	@$ 1.60/unit	= $ 35.20
Feed 2	alfalfa	.43	ton	@$ 20.00/unit	= $ 8.60
Feed 3	mineral	7	lbs.	@$ .18/unit	= $ 1.26
Feed 4				@$ /unit	= $

Total Feed Costs — $ 45.06 (2)

3. Other Variable Costs

(a) Vet, medical, operating cost of facilities and equipment and miscellaneous costs — $ 15.00

Interest on costs of feeder, feed and operating cost

(b) Feeder cost (1) 289 × .15 (%/100) interest rate × .33 portion of year on feed — = $ 14.31

(c) Feed and operating cost: Feed cost (2) 45.06 + operating (3.a) $15 = $60.06 × ½ = $30.03 × .15 (%/100) interest rate = $4.50 × .33 portion of year on feed — = $ 1.49

(d) Labor cost: Hours (3 to 5)________ @$ 0 per hour — = $

(e) Death loss[1]: Feeder cost (1) $2.89 × .01 (%/100) — = $ 2.89

(f) Marketing costs includng hauling and commission — $ 10.00

Total of Other Variable Costs — $ 43.69 (3)

4. TOTAL VARIABLE COSTS (1 + 2 + 3) — $ 3,77.75 (4)
5. TOTAL FIXED COSTS
   Depreciation, insurance, taxes and interest on building and equipment — $ 5.00 (5)
6. TOTAL OF ALL COSTS (4 + 5) — $ 382.75 (6)

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7. Necessary selling price per 100 lb to cover cost of feeder, feed and other variable costs (4) ÷ market weight × 100 (616) — $ 61.32 (7)
8. Necessary selling price per 100 lb to cover total cost of finishing animal (6) ÷ market weight[2] × 100 (616) — $ 62.13 (8)
9. Estimated selling price per 100 lb — $ 68.00 (9)
10. Estimated profit and return to management per 100 lb (9-8) (and labor) — $ 5.87 (10)
11. Estimated profit and return to management per head (10) × 6.16 selling weight (cwt) — $ 36.16 (11)

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[1]Approximately 1 percent for yearlings, 2 percent for calves.
[2]Does not include a return to management or profit.

(BACKGROUNDING)

CATTLE—FEEDING WORK SHEET

VARIABLE COSTS

1. Feeder cost_____cwt. pay weight @$_____per cwt. $__________ (1)
2. Feed Cost:

	Quantity	Unit		
Feed 1	________	________	________	@$_____/unit = $_______
Feed 2	________	________	________	@$_____/unit = $_______
Feed 3	________	________	________	@$_____/unit = $_______
Feed 4	________	________	________	@$_____/unit = $_______

Total Feed Costs $__________ (2)

3. Other Variable Costs
   - (a) Vet, medical, operating cost of facilities and equipment and miscellaneous costs $________

   Interest on costs of feeder, feed and operating cost
   - (b) Feeder cost (1)____×.___(%/100) interest rate × .33 portion of year on feed = $________
   - (c) Feed and operating cost: Feed cost (2)______+ operating (3.a) = $________
     $___= $______× ½ = $______×.___(%/100) interest rate = $____×.____ portion of year on feed
   - (d) Labor cost: Hours (3 to 5)________@$ 0 per hour = $________
   - (e) Death loss[1]: Feeder cost (1) $_____×.___(%/100) = $________
   - (f) Marketing costs includng hauling and commission $________

   Total of Other Variable Costs $__________ (3)
4. TOTAL VARIABLE COSTS (1 + 2 + 3) $__________ (4)
5. TOTAL FIXED COSTS
   Depreciation, insurance, taxes and interest on building and equipment $__________ (5)
6. TOTAL OF ALL COSTS (4 + 5) $__________ (6)

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7. Necessary selling price per 100 lb to cover cost of feeder, feed and other variable costs (4) ÷ market weight × 100 $__________ (7)
8. Necessary selling price per 100 lb to cover total cost of finishing animal (6) ÷ market weight[2] × 100 $__________ (8)
9. Estimated selling price per 100 lb $__________ (9)
10. Estimated profit and return to management per 100 lb (9-8) (and labor) $__________ (10)
11. Estimated profit and return to management per head (10) × _______ selling weight (cwt) $__________ (11)

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[1]Approximately 1 percent for yearlings, 2 percent for calves.
[2]Does not include a return to management or profit.

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