

# Beef Logic

by R.A. (Bob) Long



## How cow size relates to efficiency

Ideal size for a brood cow is a frequent topic of discussion whenever seedstock producers and commercial cow-calf operators get together. Most breeders champion a favorite weight or rule of thumb however, there is no simple answer to this complex problem.

Feed costs are a major item in beef production, so most breeders think in terms of feed requirements and are well-aware small cows require less feed than larger ones. *However, the amount of feed required to maintain a cow is not proportional to her actual size or weight, but rather to her metabolic size or weight.* Metabolic size has to do with heat loss per unit of body weight and is associated with body surface area, not with weight.

Most scientists agree surface area and maintenance requirement are best measured by body weight taken to the 0.75 power. This simply means a larger cow requires less feed per unit of weight than a smaller one and, therefore, has a theoretical advantage.

A 1,600-pound (lb.) cow need not wean twice as much calf as an 800-lb. cow to be equally efficient (see Table 1). This fact discredits the popular rule of thumb that each cow wean a calf weighing 50% of her weight.

Some scientists have offered an efficiency index as a better measure of productivity:

$$\text{efficiency index} = (\text{adjusted weaning weight} \times 100) \div (\text{cow weight})^{0.75}$$

If metabolic size were the answer, cattlemen could select for larger and larger cows and produce beef more and more efficiently. Unfortunately, there are many other factors involved, including body composition, environment and breed.

Two cows of the same weight can vary widely in their maintenance requirements. For example, a smaller-framed, thick-bodied cow (thick due to heavy muscling, fat or a combination) would have a much lower maintenance requirement than a larger-framed, thinly muscled, lean cow of the same weight.

Several environmental factors also affect maintenance requirement, including

temperature, wind velocity, precipitation and humidity. The "comfort zone" for cattle is considered to be between 30° and 80° F. When the temperature goes above or below this range, the maintenance requirement increases.

In cold weather if the animal is wet, if the hair coat is thin or short, or if the cow is in

should treat cattle uniformly and under a nutritional and management program typical of the commercial herds in their respective areas.

Replacement heifers, when bred to herd mates, should calve as 2-year-olds without assistance. The steer calves resulting should have the genetic potential to weigh 1,200 lb.

Table 1: Calf sizes required for cows of differing body weights to be considered equally efficient

Cow wt., lb.	wt. <sup>0.75</sup>	Calf wt., lb.	Eff. index	Calf wt. as % cow wt.
1,000	177	500	282	50.0
1,200	203	572	282	47.6
1,400	228	643	282	45.9
1,600	252	710	282	44.3

poor condition, the feed requirement increases substantially. Similarly, when the temperature increases to greater than 80° with high humidity, additional energy is expended due to increased respiration and heart rate.

Great variation in maintenance requirement exists among breeds due to differences in inherent metabolic rates. Dairy breeds have considerably higher maintenance requirements than British beef breeds. Among the continental breeds, those selected for increased milk production also exhibit elevated metabolism, making them less efficient.

Such differences in metabolic rate can exist within breeds, and it is logical to expect an increase in maintenance requirement when selection programs emphasize high expected progeny differences (EPDs) for milk.

The fact remains that small cows eat less total feed than larger ones. The small cow is preferred if she can produce a calf that will grow rapidly and produce a USDA Choice, high-cutability, 700- to 800-lb. carcass. Unfortunately, most small cows must be bred to large, growthy bulls to produce such calves, and this can lead to calving troubles.

Conclusion: Brood-cow efficiency is complex, and every contributing factor must be considered. Purebred breeders

at 13-14 months of age and produce a USDA Choice, Yield Grade (YG) 2 carcass. Cattle not meeting these standards should be culled. The best of the cattle that meet these requirements should be retained for herd improvement, and the rest should be offered for sale with complete performance records.

Commercial cow-calf producers should buy bulls from the breeders who follow this program. Cow size will take care of itself.

### We Welcome Your input!

Our Beef Improvement section has been expanded to include more information for today's performance-minded breeder. Both "Beef Logic" by Bob Long and the "What's Your Beef?" columns serve as a forum for Angus breeders and industry experts to express their opinions on current issues and topics of breed improvement and performance programs.

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