

## Meeting the Challenges of Pasture-finished Beef

Ed Rayburn, Extension Forage Agronomist

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Interest in pasture-finished beef is on the increase, again. This was a hot topic in the 1970s because of low cattle prices. Today, new perceptions of the nutritional value of pasture-finished beef compared with feedlot beef and perceptions of pastures being more animal and environmentally friendly than feedlots have renewed farmer and consumer interest in this product.

Since the 1950s commodity beef packers have had little interest in pasture-finished beef, claiming that they have yellow fat, are dark cutters, lack marbling and tenderness, and have a grassy flavor. Because of this discrimination, buyers often give a 10 percent to 20 percent discount on pasture-finished animals.

Under proper management, however, these adverse characteristics are unlikely. The management practices most appropriate for pasture-finishing cattle depend on several things that revolve around the market and the farm where the beef is being produced.

### The Market

Most pasture-finished beef is sold in a niche marketing system, not part of conventional commodity beef. There are many niche markets so the producer needs to identify which niche is being targeted and what product specifications the customer's desire.

Customer specifications may include meat quality, portion or package size, and production system. Meat quality includes fat content, fat type (does it contain high amounts of omega-3 fatty acids and CLA), flavor, and tenderness. Portion or package size includes how big the

roasts and steaks are (ribeye area) and the minimum volume sold--whole animal, side, quarter or split side, or individual cuts. Production system characteristics include whether the system is animal or environmentally friendly, whether it produces a product free from added hormones and antibiotics, and whether it is produced organically.

The butcher you work with has an influence on meat quality, consumer satisfaction, and marketing. Is the butcher set up for aging carcasses, is he or she making the cuts desired, and is he or she willing to package them in the size packages requested?

### Fat content

How much fat do customers want in their meat? Fat adds flavor to meat and helps maintain tenderness and moisture in the cooked product. A body fat content of 20 percent to 25 percent of empty body weight is needed for good eating quality. The animal's body fat content is determined mainly by its frame size, gender (Table 1), and body weight (Table 2). For animals growing at a healthy rate of gain, gain has little effect on fat content at a given weight, but it has a large effect on the time required to attain that weight. So rate of gain affects fat content at a given age and the economics of production. Low rates of gain can effectively increase the animal's frame size by causing the animal to be larger at a given body fat content. For a given frame size, heifers will weigh 80 percent and bulls 120 percent of herd-mate steers having the same body fat content. Body condition at harvest can provide an "eyeball" estimate of the body fat content of a beef animal at harvest (Table 3).

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## Fat type

Today there is much interest and excitement about high-quality fats reputed to reduce the risk of heart disease, diabetes, and cancer. These fats are the omega-3 fatty acids and conjugated linoleic acid (CLA). Pasture-raised animals produce products containing more of these fatty acids than animals raised on grain diets. Pastured animal products are also higher in antioxidants that may have similar health benefits (vitamin E, beta-carotene, and other plant pigments). It appears that these phyto-nutrients (plant nutrients) are greatest in animal products that have been raised solely on pasture and decrease in proportion to the hay and grain fed to the animals. To provide the highest concentration of these phyto-nutrients in pasture-finished beef, producers need to eliminate the use of carbohydrate grains, such as corn. The economics of such practices need to be weighed against the market value of the resulting product when determining the best management practice.

Increasing research evidence supports the contention that pasture-finished beef is chemically different from feedlot beef. However, there is less evidence proving conclusively that these nutritional chemicals improve human health. So, when advertising, producers need to be careful not to make claims that are not approved by FDA.

## Tenderness

The animal's age and fatness at harvest and genetics at birth largely determine meat tenderness. Animals harvested by 2 years of age with a good fat cover are most likely to display their genetic potential for tenderness. As the animals age, the potential for meat tenderness decreases. Animals with little fat cover cool too quickly after harvest and may become less tender. Aging beef for two to three weeks at 39° F will increase meat tenderness.

## The Production Environment

A second set of factors centers around the management team and the farm environment. What are the goals and interests of the pasture-finished beef producer? Does he or she have a strong attachment toward a given beef breed? What are the financial goals? Is the farm at a low elevation in the rain shadow of the Allegheny Mountains, making it warm with a high potential for summer drought, or is it at a high elevation in the mountains where it is cool with less drought risk? Does the farm have good soils with the depth and fertility needed to produce high-quality forage? Does the farm have adequate water and fencing for livestock?

## Livestock and Pasture Management

"Begin with the end in mind" by selecting cattle that will work on grass and give the carcass size and quality desired by customers. Steers that are frame 4 through 5 and early-maturing will do best for pasture finishing. Breeds that will usually provide this type of animal are the British breeds such as Angus, Hereford, Shorthorn, Murray Greys and Red Devon. British-continental crossbreds and straight continental cattle may work when a larger, leaner carcass is desired. Within any breed, there will be families of cows and bulls that meet a specific production goal better than other families.

The cattle should have capacity and muscling or be "deep and wide." Select bulls on the small end of medium frame (FS 5.0-5.8). If ultrasound data are available, select bulls with a ribeye area to live weight ratio of 0.01 or better so that a 1,200-pound animal is likely to give a ribeye area of 12 square inches. Select for cows that produce early-maturing steers that finish around 1,000 to 1,150 pounds. These cows will have a mature size of 1,100 to 1,200 pounds.

Where the major enterprise is larger frame steers for the commodity market, heifers can be held back for pasture finishing since they mature earlier (lay down fat at a lighter body weight). Frame 6 heifers finish at about the same weight as frame 5 steers.

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Pasture management is needed to maintain forage quality and quantity and can be summarized with the acronym VALUE. For finishing beef on pasture, this is:

- V**egetative--to maintain forage quality;
- A**vailable--to maintain high forage intake;
- L**egumes--to maintain high forage intake and daily gain;
- U**tilization--at a low grazing pressure to ensure high intake, and cleanup with cows;
- E**nvironment--match the finishing season to a cool environment for high-quality pasture and high intake (little heat stress on the animals) during the finishing period.

Legumes increase livestock daily gain at the expense of stocking rate. Animals eat more legume than grass forage because they digest legumes more rapidly. The net effect is that an orchardgrass-ladino clover pasture produces as much gain per acre as orchardgrass fertilized with 200 pounds of nitrogen/acre/year but on fewer head of animals or in fewer days per acre. Kentucky-bluegrass white clover pasture produces almost as much gain as improved orchardgrass-ladino clover pasture. Soil fertility and pH must be maintained so that the legumes will respond to good grazing management.

Cattle begin to lay down intramuscular fat when they reach about 65 percent of their mature size. From this point, they should be on the highest quality forage available. For a quality product, aim for a finishing gain during the last 30 to 60 days of 1.5 to 2.0 pounds/head/day. This is achievable in cool weather on high-quality pasture. On the other hand, a mature animal may gain carcass quality at a low weight gain by depositing fat in the body while there is little protein or bone growth.

Grazing management should include a buffer to balance spring and summer pasture production with animal demand. A common buffer is to hay part of the spring growth and then bring this land into the grazing system during the summer to provide more pasture acreage.

Finishing cattle should be allowed to graze at a low grazing pressure to ensure high intake and selective grazing. Let finishing animals leave half to two-thirds of the pasture behind when they are moved to a new paddock. Then clean the field up, using beef cows to maintain quality for the next grazing cycle.

## Summary

The keys to a successful pasture-finished beef operation are to:

- Identify the portion size and degree of finish (fat content) desired by customers.
- Identify what carcass weight will give the desired portion size and meat fat content.
- Identify the animal genetics (frame size, gender, breed) that will provide this acceptable carcass weight-degree of finish combination.
- Develop a forage production system that matches forage VALUE to the nutritional requirements of the growing and finishing animal so that the animal is harvested at a young enough age (gain per day of age) to ensure tenderness and profitability.

## Further Reading

Blaser, R.E., W.C. Stringer, E.B. Rayburn, J.P. Fontenot, R.C. Hammes, Jr., and H.T. Bryant. 1977. Increasing digestibility and intake through management of grazing systems. *In* Forage-fed beef: Production and marketing alternatives in the South. Southern Coop. Ser. Bull. 220. <http://www.wvu.edu/~agexten/forglvst/Bulletins/Forage-Fed%20Beef/Forage-Fed%20Beef.htm>

Blaser, R.E., H.T. Bryant, R.C. Hammes, R.L. Boman, J.P. Fontenot, C.E. Polan, C.Y. Kramer. 1969. Managing Forages for Animal Production. Va. Agr. Exp. Sta. Bull. 45. VPI and SU. Blacksburg VA 24061 88pp. <http://www.wvu.edu/~agexten/forglvst/Bulletins/Managing%20Forage%20for%20Animal%20Production/Managing%20Forage.htm>

Martz, F. 2000. Pasture-Based Finishing of Cattle and Eating Quality of Beef. Mo. Ag. Expt. Stat. Forage Systems Research Center Rpt. March 21, 2000. <http://aes.missouri.edu/fsrc/research/pasture.stm>

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Table 1. Effect of frame size on expected weight of finished bulls, steers, and heifers and on mature weight of breeding females. (Adapted from Fox et al. 1992, J. An. Sci. 70:3578)

Frame size	Weight of feeder cattle at 28% body fat			Breeding females
	Bulls	Steers	Heifers	Mature wt
1	1056	880	704	880
2	1142	952	762	952
3	1232	1027	822	1027
4	1320	1100	880	1100
5	1408	1173	938	1173
6	1496	1247	998	1247
7	1584	1320	1056	1320
8	1672	1393	1114	1393
9	1760	1467	1174	1467

Table 2. Empty body fat content of a medium-frame British breed beef steer relative to shrunk weight of the live animal (adapted from NRC 1996).

Shrunk body weight lbs	Body fat %
500	15.7
600	18.2
700	20.7
800	23.2
900	25.6
1000	28.1
1100	30.6
1200	33.0

Table 3. Body condition description of beef cattle for condition scores 4 to 6 from the 9-point condition score scale used for beef cattle (Adapted from Fox et al. 1992, J. An. Sci. 70:3578).

Beef body condition score	Body fat content	Appearance of cow
4	18.1	Individual ribs not obvious; some fat cover over the ribs and hipbones; can feel spine but it is not sharp.
5	22.5	Fat on either side tail head and over rump; pelvis felt with slight pressure; ends of short ribs felt with pressure; thick layer of fat on top; can feel fat over ribs.
6	26.9	Pressure required to feel backbone; can feel considerable fat over ribs.
7	31.2	Folds of fat at tail head, patches of fat at pin bones; pelvis felt with firm pressure; short ribs not felt with firm pressure; spongy over ribs; some fat in brisket.