Selection, Management and Nutrition of the Cow Herd

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The most important factor affecting profit in a cow-calf enterprise is pounds of calf weaned per cow exposed during the previous breeding season. This pounds-of-calf-weaned factor is influenced by breeding stock selection, herd management and nutrition.

The purpose of this publication is to present facts and make recommendations that will help the cow-calf producer: (1) decide on the type of female breeding herd best suited to his situation, (2) develop a selection program for quality herd replacements, and (3) apply those feeding and management practices that insure top animal performance while minimizing calf loss. A list of related Purdue Extension publications is presented on page 6.

SELECTION CONSIDERATIONS

The first step toward a successful and profitable cow-calf enterprise is selection of heifers or cows that will settle early in the breeding season and wean heavy, high quality calves every 12 months.

Start with Heifers or Cows?

For an established producer, the best source of heifers is usually his own herd. However, one getting started in the cow-calf business must initially purchase his breeding stock. Here are four ways to start the cow herd. The advantages and disadvantages of each are summarized in Table 1.

1. Heifer Calves without Performance Records. Large groups of good heifer calves are most numerous in the fall. Those selected should be individually weighed and identified at time of purchase, then developed on a high-roughage growing ration. Before the breeding season, weigh the heifers again, and select for breeding the larger ones that have gained well, but are not overfat.

2. Open Heifers with Performance Records. Select such heifers on the basis of their 205-day and 365-day weights and weight ratios. Consider only those that have performed in the top three-fourths of the herd—that is, with weight ratios above 90. Purchase them at 12-13 months of age so they can be isolated 30 to 60 days before the breeding season begins (when they average 15 months of age).

3. Bred Yearling Heifers. Purchase about 25 percent more heifers than you need in the herd. It’s advisable either to have them pregnancy-tested before paying for them, or to buy them subject to being guaranteed pregnant. Also consider the potential for calving problems resulting from the sire to which they are mated. Cull the least desirable heifers prior to calving; or better yet, wait until they calve, and sell those that lose their calves at or soon after parturition because of calving difficulty, failure to claim their calf, etc.

4. Mature Cows. Generally, it’s not advisable to buy mature cows. Chances are they are being culled from someone’s herd because of poor reproductive performance, light calves, old age, mastitis or other health problems. However, if cows are nursing calves, the probability of infertility is less, and you can sometimes get a good three-in-one package if the cows are rebred.

Before buying breeding stock, observe them closely for potential health problems, such as internal and external parasites, and have them tested by a veterinarian for tuberculosis, brucellosis and leptospirosis. Also, isolate for 30 to 60 days after they arrive on your farm.
Table 1. Some Advantages and Disadvantages of Starting With Different Types of Breeding Stock.

<table>
<thead>
<tr>
<th>Category of female</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Heifer calves without</td>
<td>Low investment per animal—about $2-3 per hundredweight above normal market price. Culled heifers can be marketed as feeders or finished in feedlot.</td>
<td>First calf crop won't be weaned for 2 years. No performance information on which to make initial selections.</td>
</tr>
<tr>
<td>performance records</td>
<td></td>
<td>No early return on investment. Nearly 2 years before their first calf crop is weaned.</td>
</tr>
<tr>
<td>2. Open heifers with performance</td>
<td>Much performance information on which to base selections. A choice regarding breed and type of bull to which you mate them.</td>
<td>May be costly, especially if purchasing heifers bred to “exotic” breeds of bulls. May find some heifers not pregnant if not tested when purchased.</td>
</tr>
<tr>
<td>records</td>
<td></td>
<td>No early return on investment. Nearly 2 years before their first calf crop is weaned.</td>
</tr>
<tr>
<td>3. Bred yearling heifers</td>
<td>Earlier return on investment than with open heifers. If diagnosed pregnant, less chance of having open heifers at calving.</td>
<td>May be buying someone’s problems unless you purchase cows of known health, status and productivity from reputable producer.</td>
</tr>
<tr>
<td>4. Mature cows</td>
<td>Quickest way to build a herd and return on your investment, especially if cows are nursing calves and are rebred. Can sometimes purchase a bred cow about as cheaply as a heifer calf.</td>
<td>Productive years of the herd are shorter than with younger heifers.</td>
</tr>
</tbody>
</table>

Purebred or Crossbred Heifers?

If you plan to establish a purebred herd, you must purchase pedigreed animals. And registered cattle cost more than grade animals, even though registration guarantees little more within most breeds than a record of ancestry. Some beef cattle breed associations, however, require a minimum level of performance before an animal of that breed can be registered.

When selecting purebred heifers: (1) determine current popularity of the breed and the bloodline; (2) buy from a reputable breeder who is performance testing; (3) select heifers with weight ratios over 90 and that are structurally sound, have ample muscling and are not overfat; and (4) be sure that they have a clean bill of health, being free from tuberculosis, brucellosis and leptospirosis.

For the commercial cow-calf producer, the breed or cross is probably less important in determining profits than is management. Therefore, he should probably start with first-cross (F₁) heifers. (But don’t pay two or three times their realistic value just because they are “exotic”!

Compared to purebreds, F₁ crosses among beef breeds have these advantages: (1) they reach sexual maturity about 1 month earlier; (2) they wean 5-7 percent more calves; (3) they wean calves that are 5 percent heavier; and (4) they attain peak productivity 1-2 years sooner.

As can be the case with purebreds, there are just as many inferior crossbred heifers as there are good ones. Therefore, check the performance, breed and percentage of blood of crossbred females. The superiority of the various types generally ranks as follows: (1) an F₁—two-bred cross, (2) a three-bred cross, (3) an F₂—cross between F₁’s, (4) a backcross—F₁ mated to one of the parent breeds, and (5) a “mongrel”—an animal of unknown breeding and description.

No single crossbred female is best for all regions and management systems. Instead, selection should be made on the basis of the producer’s particular management program. For instance, since feed requirements are directly related to a cow’s milk production potential, an Angus-Herford F₁ female is better suited to regions where forage may be limited; whereas a Red Poll-Herford F₁ or a ¾ Angus-¼ Holstein crossbred female may prove the most productive in areas where forage is abundant.

Conformation

Structural and reproductive soundness are important if a cow is to have a long and productive life. A desirable heifer should have: (1) structural soundness, as indicated by good feet and legs; (2) good skeletal size, as indicated by a long body and height of shoulder; (3) a well-developed udder; and (4) moderate muscling in the forearm and stifle regions.
Avoid heifers with excessive muscling. They will likely have lower conception rates, more calving problems and may produce “double-muscled” offspring. Therefore, don’t make muscling your primary criterion for selecting heifers, but rather emphasize those traits (skeletal size, structural soundness, good udder) that will aid the female in producing a heavy calf each 12 months.

**Condition**

Heifers selected should be moderately-fleshed—that is, neither thin nor overfat. With thinly-fleshed heifers, it may be impossible to get them in proper condition by the time breeding season begins. Overfat heifers often have lower conception rates and greater calving difficulty, produce less vigorous calves, and give less milk than moderately-fleshed dams.

Thus, select moderately-fleshed heifers that have not had access to large quantities of high-energy creep feed, which contains mostly corn or protein supplement. Such females will likely wean more pounds of calf in their lifetime than heavily creep-fed heifers that are overfat.

**MANAGEMENT CONSIDERATIONS**

The beef cow is pregnant 283 days of the year. Generally, she will not recycle and come into estrus until 50-60 days after calving. This leaves just a little more than 20 days in which she must be bred and conceive if she is to calve on schedule every 12 months (Figure 1). Proper management of the cow herd can contribute significantly toward shortening the 60-day post-partum period, increasing fertility during the breeding season, and increasing milk production.

![Figure 1. Cow reproductive calendar.](image)

**Management During the Breeding Season**

The breeding season should be limited to 60 days for cows and 75 days for yearling heifers. Each 21-day (one heat cycle) delay in breeding costs 30-40 pounds in calf weight at weaning. Therefore, if your breeding season extends beyond this, you can begin shortening it a few days each year by culling the “open” females and those that will calve late next year.

Besides a heavier calf crop, a short breeding season means a more uniform group of calves that will be easier to manage and can be castrated, vaccinated and handled together. Also, the cow herd can be fed and managed as a single group much more effectively.

It is more profitable to calve a heifer at 2 years of age than at 3, because she will produce more pounds of calf in her lifetime. Heifers weighing 600-700 pounds are ready to breed at 15 months of age. Breed them starting 2 weeks before the rest of the herd; this permits closer observation and special attention at calving. A heifer that calves early during her first year will tend to calve early throughout her lifetime.

Number of females per bull in the breeding pasture depends on the age of the bull. A yearling bull should breed up to 15 females and a mature bull up to 30 females in a 60- to 75- day breeding season. If herd size is such that four or more bulls are needed, you should separate the herd into groups and run no more than two bulls together. This makes close observation of the herd easier.

Watch the bulls closely to make sure they are finding the cows that are in heat and are breeding them. Record breeding dates when known. Watch cows to recycle. If several come back into estrus (heat), this might mean bull fertility problems or disease in the cow herd.

**Management During Gestation**

When the cow becomes pregnant, her estrus cycle ceases. Thus, by close observation of estrus, one can get an indication of the herd’s fertility, discover and treat a reproductive disease, or detect and replace an infertile bull before a year’s calf crop is lost.

Another way to determine pregnancy is a rectal palpation of the reproductive tract (Figure 2). An experienced technician using this method can detect pregnancy as early as 45 days after conception. However, the most practical time to pregnancy test is at weaning, when cows should be 3 to 5 months pregnant.

By “working the herd” at this time, a number of other profitable management practices besides the pregnancy test can be performed, such as
weighing, identification, parasite control and vaccinations. This is also an ideal time to cull open cows and possibly those that were bred late in the breeding season.

No producer can afford to carry an open cow or heifer over the wintering period. And chances are that if a cow skips one year, she will probably skip sometime again during her lifetime. A pregnancy test usually costs between $1 and $2 per cow, depending upon number examined and handling facilities available. That’s cheap “insurance” against the high cost of maintaining a non-producing breeding animal.

Management at Calving Time
The goal here is to get a live calf from every cow. Each calf lost means no return to your cost of maintaining that cow for a year’s time ($125 to $175) and no profit from the calf.

Calves dropped on clean, dry bedding or on well-drained pasture with natural protection will have fewer scourgs and other diseases than those born under wet, drafty conditions.

Observe cows frequently at calving time. Most calving difficulty will be with first-calf heifers, so watch them closely. If a cow has been in labor for more than 2 hours, it may be necessary to examine the fetus and correct a problem, such as front foot bent back or the calf’s head turned back. However, if there is a severe position problem, such as a breech birth or an extremely large fetus, professional assistance is needed. (Note: For a thorough discussion of the calving management principles that will help minimize calf loss, see Purdue Extension publication AS-405, page 6.)

As cows calve, regroup them into another pen or pasture apart from the dry cows, because they must be fed differently, as discussed in the next section.

NUTRITIONAL CONSIDERATIONS
Proper nutrition of the cow herd both before and after calving is one key to insuring a short and successful breeding season. A balanced ration that provides proper levels of protein, energy, minerals and vitamin A will mean: (1) more cows in heat early in the breeding season, (2) more settling at first service and (3) more calves born early in the calving season.

Nutrition During Gestation
In the summer, pregnant breeding females can meet their energy and protein requirements by grazing, if ample forage is available. Only supplemental iodized white salt and a mineral mix containing at least 8 percent phosphorous need be provided free-choice. In the winter when grazing is limited, proper nutrition level must receive more attention, since total feed requirements depend on age, size, body condition and stage of production.

Table 2 presents the energy—or total digestible nutrients (TDN)—and protein needs of bred yearling heifers and dry pregnant mature cows. As can be seen, the heifers require more energy and protein. This is because they should gain 75-100 pounds going into the winter to offset some of the weight lost at calving time. Mature cows in moderate to good flesh condition, on the other hand, need only to maintain body weight up to the last third of pregnancy, then should receive somewhat higher energy-protein levels to insure fetal growth without loss of condition.

Table 2. Daily Energy and Protein Requirements of Pregnant Yearling Heifers and Mature Cows.*

<table>
<thead>
<tr>
<th>Type of female</th>
<th>Body weight</th>
<th>TDN</th>
<th>Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearling heifer</td>
<td>700</td>
<td>7.7</td>
<td>1.28</td>
</tr>
<tr>
<td>in last third of pregnancy</td>
<td>800</td>
<td>8.3</td>
<td>1.37</td>
</tr>
<tr>
<td>Mature cow in middle third of pregnancy</td>
<td>1000</td>
<td>8.0</td>
<td>0.87</td>
</tr>
<tr>
<td>Mature cow in last third of pregnancy</td>
<td>1200</td>
<td>9.2</td>
<td>1.00</td>
</tr>
<tr>
<td>Mature cow in pregnancy</td>
<td>800</td>
<td>8.3</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>1000</td>
<td>9.5</td>
<td>1.07</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>10.7</td>
<td>1.19</td>
</tr>
</tbody>
</table>

* Values adapted from 5th revised edition, Nutrient Requirements of Beef Cattle, National Academy of Sciences, 1976.

Figure 2. Pregnancy testing at 4-5 months by rectal palpation of the reproductive tract. (From Extension Publication B-1077, Texas A & M University.)
Cow condition at calving time affects rebreeding. For optimum rebreeding results, all cows at calving should be in moderate to good condition. Thus, “fleshy” cows do not need to be fed at the nutrient levels in Table 2, whereas those in thin condition would require 15-20 percent higher levels than shown.

An example of an adequate winter ration for pregnant yearling heifers and thin cows is: 18-20 pounds of good quality hay or 40 pounds of corn silage, plus 1 pound of 32 percent protein supplement (salt and mineral mix provided free-choice at all times). Mature cows in good flesh condition can receive 10-15 percent less or utilize lower quality feeds, such as crop residues, if supplemented with protein and vitamin A.

Nutrition During Lactation

After calving, a cow’s energy needs increase 50-60 percent and her protein needs double. This is because she is nursing a calf and at the same time her reproductive tract is preparing for rebreeding. Although nutrient requirements are still influenced somewhat by body size, they are affected primarily by level of milk production in the first 4 months after calving. Table 3 shows the energy and protein needs of lactating cows having average and superior milk production potential. (Superior milkers are generally those with 1/4 to 1/2 dairy breeding.)

During the grazing season, lactating cows can meet their energy and protein requirements if ample forage is available. (Again, supplemental iodized salt and mineral mix with 8 percent phosphorus must be provided.) If adequate pasture is not available, these suggested rations should supply the higher nutritional levels shown in Table 3—(1) 25 pounds of high quality grass-legume hay per day or (2) 16-18 pounds of grass-legume hay plus 20 pounds of corn silage per day.

Following weaning of the calf, nutrient needs of the beef cow are lowest until two months prior to her next calving. With spring-calving cows, this period is during fall and winter when it is necessary to feed harvested forages.

Formulating Adequate Rations

If possible, feeds (especially forages) should be tested occasionally for nutrient content to insure that the cow herd is receiving proper nutrition in the various stages of production (i.e., pre-breeding, gestation, lactation).

Table 4 lists average protein and TDN levels in some common feeds. Using the values in Table 4 or results of a feedstuffs test, together with Tables 2 and 3, which give the nutrient needs of pregnant and lactating cows, one can formulate rations and determine how much of each ingredient must be fed to meet herd protein-energy requirements.

DEVELOPING REPLACEMENT HEIFERS

Level of nutrition and weight gain greatly influence future reproductive performance. Properly-developed heifers reach puberty at an earlier age, and a higher percentage conceive early in the breeding season.

Fleshy, small-framed heifers should be fed to gain about 1 pound per day from the time they are weaned until breeding and should weigh 600-650 pounds at 15 months. Large-framed heifers may gain up to 1 1/2 pounds per day within this period and should weigh 700-750 pounds at 15 months.

Fall-weaned heifers will make this optimum rate of gain on a winter ration of 30 pounds of corn silage and 1 1/2 pounds protein supplement daily plus vitamin A. Another satisfactory ration is 10 pounds of good quality grass-legume hay and 3-4 pounds corn grain.

<table>
<thead>
<tr>
<th>Feed stuff</th>
<th>Dry matter</th>
<th>TDN</th>
<th>Protein percent, as-fed basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grass hay (bloom)</td>
<td>85</td>
<td>50</td>
<td>9.0</td>
</tr>
<tr>
<td>Grass hay (mature)</td>
<td>85</td>
<td>43</td>
<td>6.0</td>
</tr>
<tr>
<td>Grass-legume hay</td>
<td>85</td>
<td>52</td>
<td>13.0</td>
</tr>
<tr>
<td>(bloom)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn stover (dry)</td>
<td>85</td>
<td>38</td>
<td>3.5</td>
</tr>
<tr>
<td>Wheat straw</td>
<td>85</td>
<td>38</td>
<td>2.0</td>
</tr>
<tr>
<td>Corn silage</td>
<td>35</td>
<td>24</td>
<td>2.8</td>
</tr>
<tr>
<td>Corn grain</td>
<td>89</td>
<td>80</td>
<td>9.0</td>
</tr>
<tr>
<td>Protein supplement</td>
<td>89</td>
<td>78</td>
<td>44.0</td>
</tr>
<tr>
<td>Soybean meal</td>
<td>90</td>
<td>70</td>
<td>32.0</td>
</tr>
<tr>
<td>Dry (32 percent)</td>
<td>90</td>
<td>70</td>
<td>40.0</td>
</tr>
<tr>
<td>Dry (40 percent)</td>
<td>90</td>
<td>70</td>
<td>40.0</td>
</tr>
<tr>
<td>Liquid (32 percent)</td>
<td>65</td>
<td>50</td>
<td>32.0</td>
</tr>
</tbody>
</table>
Over-feeding hurts reproductive performance. Overfat heifers usually require more services per conception, have more calving difficulty, and give less milk than one properly fed.

Creep Feed Replacement Heifers?

Creep feeding will adversely affect the lifetime productivity of a heifer calf if it causes her to become overtated. Much of this fat is permanently deposited in her udder and inhibits formation of milk-secreting tissue. For this reason, calves from dams that were once creep-fed themselves often weigh less at weaning than calves nursing non-creep-fed dams.

Creep feeding of replacements, especially those from first-calf heifers, may be beneficial if pastures are dry and milk production from the dam is low. But limit the creep feeding to supply only enough energy for normal growth and maintenance. Two to 3 pounds per day of supplemental feed should be adequate.

PRODUCTION RECORDS

Keeping complete and accurate production records on the cow herd is an important part of cow-calf management. Measuring differences among animals in traits of economic importance and using those records to select replacements, will result in herd improvement and greater profits.

The Indiana Beef Performance Testing Program offers cow-calf producers a record-keeping system to help them accurately evaluate their cattle. Each animal in the herd is permanently identified, and records are kept on the performance of calves from each cow. Weights are adjusted for differences in age of calf and age of dam. Then, standardized records are used to assist in culling low-producing cows, selecting replacement heifers and evaluating herd sires.

It's not uncommon to identify a cow that is producing 100 pounds more calf at weaning than another cow of the same size and age, even when bred to the same bull. Likewise, average weights of calves from two different sires may vary by 50 pounds or more in the same herd.

Related Publications

Single copies of up to 10 different titles of the following Purdue Extension publications are available free to Indiana residents from their County Extension Office or by writing the Publications Mailing Room, Cooperative Extension Service, AGAD Building, Purdue University, West Lafayette, Indiana 47907:

"Assisting the Beef Cow at Calving Time" (AS-405)
"Beef Cattle Identification Methods" (AS-410)
"Beef Herd Management Calendar—Spring Calving Program" (AS-414)
"Beef Performance Testing—Questions and Answers" (AS-331)
"Cow-Calf Record Book" (AS-412)
"Creep Feeding of Beef Calves" (AS-415)
"Handling Facilities for Beef Cattle" (ID-109)
"Health Programming in the Beef Cow Herd" (VY-47)
"Individual Beef Cow Record" (AS-416)
"Management and Economics of a Beef Cow Herd AI Program" (ID-100)
"Management of the Calf Crop" (AS-397)
"Minerals for the Beef Cow" (AS-411)
"Selection and Management of Herd Bulls" (AS-395)
"Twenty Ways to Wean More Pounds of Beef" (AS-406)