

The Genetics and Management of Sound Feet and Legs in Dairy Animals

Jeffrey F. Keown, Extension Dairy Specialist
Paul J. Kononoff, Extension Dairy Specialist

Sound management of feet and legs in dairy animals affects performance. This guide offers suggestions for good management practices.

Two major parameters affect the selection process for any trait: the heritability of the trait as well as the variation associated with the trait. The heritability for the most commonly measured feet and leg traits are given below:

Rear Legs, Side View	.19
Rear Legs, Rear View	.14
Foot Angle	.10

These heritabilities should be compared with those for the production traits of milk, fat and protein pounds that consistently range from .25 to .30. Therefore, even under the most stringent selection process you will not be able to make as much progress in selection for feet and leg traits as for production traits.

One other confounding factor should be considered when selecting any non-production trait: the accuracy of the evaluation process. With production traits, the output can be weighed and measured very accurately and we usually have 10 recordings for a given lactation. For the non-production traits, we have one person's opinion of what the various components of a cow look like on one day during the lactation. This observation is subjective and not objective as are the production traits. This is why many producers are disappointed with their breeding outcomes when breeding to improve non-production traits.

Another problem with the process, especially for feet and legs, is how we accurately account for the environment that a cow is reared in when doing the evaluations. We all realize that if a cow is pasture reared, she will, in all probability, have fewer feet and leg problems than if she were raised and housed in a free stall or stanchion barn. These are all factors to consider when discussing the heritability of feet and legs.

Having discussed many of the inherent problems associated with feet and leg measurements, there have been several studies showing there are associations between several feet and leg measurements and economic traits. An exhaustive study was conducted by Ben McDaniel, professor of Animal Science at North Carolina State University in the late '70s and early '80s that uncovered many of these relationships. The study involved actually measuring the hoof angle and hoof length on several thousand cows to see if these measurements could be associated with production traits. McDaniel found that the heritabilities for hoof angle and hoof length were .24 and .38 for first lactation measurements and .34 and .24 for later lactations. The most important findings from the studies were:

- More cows with shorter, steeper claws are inseminated.
- There were fewer days open for cows with shorter or steeper claws.
- An increase of 5° in toe angle in first lactation was associated with a 503-pound increase in second lactation milk production.
- A decrease in 10 mm of toe length in first lactation equated to a 1,475-pound increase in second lactation milk production.
- Cattle with longer claws had more dermatitis.
- Cattle with deeper heels had more sole ulcers.
- Longer claws and lower angles were associated with lower survival rates.

This study clearly shows a direct economic benefit to having cattle with steep toe angles and short toe length in the herd. Why not look at your herd to see if this study can be verified in your cattle?

Let's get to the basic point: How should a producer select, on feet and legs, to increase herd life and production? Most every artificial insemination organization and breed association has many ways to evaluate feet and legs. The problem arises when different organizations use different terms and measurements on feet and legs. One evaluation that is consistent among all groups is foot angle. If you re-read the

previous section, you will notice that foot angle is associated with increased reproduction and production. Therefore, the recommendation should be to select on foot angle. You can use the Holstein Red Book or the information available from the A.I. organizations. So selection for feet and legs is made easy when one selects on foot angle.

There are many sound management practices that can also significantly affect the soundness of feet and legs and reduce problems, especially for cattle that are held in complete confinement. These management recommendations are largely taken from the results of McDaniels' study. He, as well as others working on this project made many observations as they visited their project herds. Among the most important are:

1. Reduce abrasiveness of new concrete before placing cows on it.
2. Reduce slipperiness of old concrete by grooving it.
3. Keep cows on dirt as much as practical. Some time every day is best.
4. Keep dry cows on pasture or dirt lots and separate them from the milking herd.
5. Preadapt heifers to concrete and use of free stalls before they calve, preferably at breeding age and again in late dry period.
6. Use a clean foot bath containing a copper sulphate solution daily.
7. Feed all cows a ration balanced for all nutrients and fiber based on feed analyses.
8. Practice preventative medicine to reduce virus diseases.
9. Have free stalls that cows like to lie in. Keep stalls dry and smooth.
10. Change cows gradually from a low-energy, dry cow ration to a high-energy, milking cow ration.
11. Handle first calvers carefully during their first 60 days after calving.
12. Routinely trim, inspect, or treat problem feet or lame cows.
13. Practice a routine inspection of each cow's feet twice a year.
14. Inspect feet of cows when they are dried off.
15. The bottoms of hooves must be viewed to determine if feet are healthy. Bad spots, heel erosion or severe wear could be present.
16. Hoof growth rates are highest in the spring, so this may be the preferred season to move into a new facility.

Remember, there are two ways to insure sound feet and legs. One is by selecting on foot angle and the other is to follow sound management practices. Additional dairy information can be found at: www.nebraskadairy.unl.edu.

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