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CALFHOOD DISEASE: AN ASSESSMENT

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Summary

Genetic, economic and epidemiological studies of disease and mortality in dairy calves born alive were surveyed. Few genetic or economic studies have been done on calfhood disease. Large scale epidemiological studies in commercial herds form the basis for conclusion on what diseases to study and the duration of calfhood health evaluation.

Keywords: calfhood disease, dairy cattle

Introduction

Genetic improvement programs for milk production in dairy cattle represent one of the important success stories in agricultural research and development. However, the correlated responses to improvement of milk yield include increased incidence of disease. Dairy geneticists are giving increasing attention to health and disease as a subject of research. Appropriately, most of this research has focused on the lactating cow. Problems associated with parturition have been addressed by implementing sire evaluations for calving difficulty. Much research has been done on the genetics of stillbirth. One aspect of health that has been overlooked is that of the newborn calf and growing heifers. The objective of this assessment is to survey genetic and epidemiological studies of disease in calves born alive.

Incidence and time of occurrence

Three major epidemiological studies of calfhood disease have been reported (Table 1). Although the methods and definitions of traits vary among studies, they provide a basis for decisions about how and when to measure

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calfhood disease. Individual calf data were collected from 35 Holstein herds on a production recording program in southwestern Ontario during a 32 month period. Treated incidents of scours (diarrhea), pneumonia, and other diseases were reported from birth to weaning for 1,968 female calves born alive. Incidence rates were based on the first occurrence; animals with multiple treatments were not counted as repeated incidents Waltner-Toews et al. 1986e). Age at weaning in this study varied widely among farms and animals (Waltner-Toews et al. 1986b). A study of 26 cooperating Holstein herds in New York during 22 months included data for 1,171 heifer calves born alive. Incidence rates from birth to 90 days of age were based on clinical signs of scours, respiratory illness, dullness and death recorded by producers. Dullness was described as listless, droopy ears, dull or off feed. Only first occurrences were included in the incidence rates (Curtis, et al. 1988a). Sixty herds in Michigan were randomly selected and recorded disease for 12 months. Disease categories included gastrointestinal, respiratory, urogenital, metabolic, multiple system and others. Multiple system conditions included weight loss, umbilical hernia, accident, fever, lethargy, weakness, poor condition, and others. Although this category is broader than the dullness condition used in the New York study, the two descriptions have much in common. All male and female calves on the farms were recorded, although many of the males were likely removed early in life. Incidence density rates were reported; second and subsequent occurrences of the same disease were reported as additional incidents (Kaneene & Hurd 1990a).

Two additional studies reported only mortality losses (Table 1). Death losses were recorded on 311 farms in Norway during two years. Altogether, 6,109 male and female calves of all breeds born alive were observed from birth to 30 days (Simensen, 1982). Mortality of Brown Swiss male and female calves in the United States was recorded from birth to day 7. Data from 7,513 live births of single calves were obtained from registered breeders over a period of 8 years (Erf et al. 1990).

Table 1. - INCIDENCE OF CALFHOOD MORTALITY AND DISEASE IN CALVES BORN ALIVE

Reference	Stage	Death (%)	Scours (%)	Pneumonia (%)	Dull (%)
Waltner-Toews 1986b	1-21 d	2.1	16.1	4.2	
Waltner-Toews 1986e	Wean	3.8	20.5	15.4	
Curtis et al. 1988a	1-21 d	1.5	11.5	3.2	4.6
Curtis et al. 1988a	1-90 d	3.5	14.6	7.4	7.7
Kaneene & Hurd 1990a	Wean		79.7	42.4	11.3
Simensen 1982	1-30 d	1.2			
Erf et al 1990	1-7 d	3.5			

Although death of calves is a costly loss, it affects a comparatively small portion of the calves born alive; mortality alone is an inadequate measure of calfhood losses. By far, the greatest calfhood morbidity is due to gastrointestinal disease (scours) followed by respiratory disease (pneumonia) and multiple system conditions (dullness). The Ontario and Michigan studies red recording for other conditions, but these were of extremely low frequency. Dullness, or multiple system condition, with an incidence rate well above zero, deserves consideration in genetic and health management programs. Dull calves were at increased risk of death, even after adjusting for occurrence of scours and respiratory illness; and dull calves were more likely to suffer simultaneously or subsequently from scours and respiratory disease (Curtis et al. 1988b).

Two reports provide weekly incidence rates for the first occurrence of disease or mortality Waltner-Toews 1986b, Curtis et al. 1988a). In one study, an animal's record was truncated at weaning (Waltner-Toews 1986b); in the other all observations were truncated at 90 days (Curtis et al. 1988a). Median age at first occurrence of morbidity or mortality is summarized in Table 2. The incidence of scours was highest during the first or second week and declined rapidly thereafter. In both studies, 80% of scours incidents during the study period had occurred by the fourth week. Respiratory disease was uniformly high for the first 4 to 6 weeks but continued to appear during subsequent weeks. Death rates were highest during the first 3 weeks, but continued at low rates subsequently. Eighty percent of incidents had been observed by the eighth or ninth week for respiratory disease and by the 7th or 9th week for death.

Table 2. - MEDIAN AGE AT FIRST OCCURRENCE OF CALFHOOD MORTALITY AND DISEASE CALVES BORN ALIVE

Reference	Stage	Death (d)	Scours (d)	Pneumonia (d)	Dull (d)
Waltner-Toews 1986a	Wean	18	12	37	
Curtis et al. 1988a	1-90 d	28		25	16
Curtis et al. 1988a	1-14 d		6		
Curtis et al. 1988a	15-90 d		30		
Simensen 1982	1-30 d	24			

Epidemiologists disagree on how to approach recording of calfhood disease. One extreme view is: "The best way of quantifying calf health

problems in dairy herds appears to be mortality of different categories of death causes" (Simensen and Norheim, 1983). A more pragmatic view is: "The most obvious measure of morbidity - farmer diagnosed and treated disease - appears on the face of it to be an unreliable measure of disease. Nevertheless, it can be argued that calf diseases measured in this way reflect the clinical syndromes of interest to dairy farmers and deserves study if only for that reason" (Waltner-Toews et al. 1986c).

Economic consequences

Economic losses from calthood disease are not well documented. The most complete study was a survey of 60 herds in Michigan that included drug, veterinary, labor, death, and preventive costs (Kaneene and Hurd 1990b). Total costs of disease per calf per year were US$ 33.46 for gastrointestinal disease, $ 14.71 for respiratory disease, $ 11.15 for multi-system disease and $ 4.62 for other diseases. These rates were averaged over all calves, not just affected calves. The authors felt that some of the cost components were underestimated or omitted in producers' records; also the chronic and long term effects of disease were not measured. Therefore, these should be regarded as lower bounds of true costs.

Two studies of the effect of calfhood morbidity on subsequent performance are based on data described above (Waltner-Toews et al. 1986e; Curtis et al. 1988a). Heifers that had been treated for pneumonia during the first three months of life were 2.5 times more likely to die after 90 days of age than heifers that had not been treated for pneumonia; and heifers treated for calfhood scours were 2.9 times more likely to calve after 30 months of age and 2.5 times more likely to be sold for dairy than those not treated for scours. The authors speculated that calves sold for dairy purposes may have been of good genetic potential but were viewed by the producers as performing below expectations due to residual effects of disease (Waltner-Toews et al. 1986a) Fifty percent of heifers without respiratory illness during their first 90 days had calved by 32 months of age; for heifers with respiratory disease, 50% calved by 36 months, a delay of 6 months (Correa et al. 1988). None of the morbidity traits affected the likelihood of being sold after three months of age. Dullness before 90 days was significantly related to death after 90 days; the hazard rate for dull calves was 4.3 times that for non-dull calves. By 17 months of age, 97% of non-dull calves were still alive, but only 88% of dull calves remained alive (Curtis et al. 1989).

Genetic parameters

Genetic studies on calfhood disease in commercial herds are virtually non-existent; a few studies on calf mortality are available. Heritability of death during days 1 to 7 after birth was estimated by a BLUP sire model from 4,630 progeny of 96 Brown Swiss sires (Erf et al. 1990). The heritability estimate was .044, although substantial differences among sire progeny groups did occur: Unadjusted mortality rates ranged from 1.1% (of 278 offspring) to 9.4% (of 107 offspring). Rank correlations of sire transmitting abilities for death during the first 7 days were .55 with dead at birth and .11 with milk yield (Erf et al. 1990). This suggests that genetic effects responsible for stillbirth have much in common with genetic effects for early mortality of live born calves; also, the association between milk yield and early calfhood mortality is low.

An epidemiological study of mortality from birth to weaning included sire as a fixed effect in a logistic model that included calving ease among other management factors. Although the sire effect was not significant, it did enter the model ($.05<P\leq .15$). The authors concluded there may be a genetic component to calf livability from birth to weaning in addition to that mediated through calving ease (Waltner-Toews et al. 1986d).

A genetic study of bovine respiratory disease in beef cattle from birth to 12 months involved 10,142 animals (Muggli-Cockett et al. 1992). Although beef breeds, production systems and management practices differ substantially from those in dairy, some inference is possible. Nearly 24% of the animals were treated at least once for respiratory disease. Among the 12 beef breeds in the study, incidence of respiratory disease ranged from 12.0±.93% (1,485 calves) to 24.6 ± 2.25% (570 calves). Heritability estimates were .10± .02 for preweaning disease and .06 ± .07 for postweaning disease (Muggli-Cockett et al. 1992).

Conclusions

Genetic and economic studies of calfhood disease are needed for making decisions about using these traits in breeding programs. Mortality by itself is an inadequate measure of calfhood disease. Scours, pneumonia, and possibly dullness merit study. Evaluation for these traits should extend for a minimum of three weeks after birth; evaluation for eight weeks would be needed to identify 80% of the disease and mortality incidents that occur in the first 3 months of life.

REFERENCES

1. Corea, M. T., C. R. Curtis, H. N. Erb, M. E. White (1988): Prev. Vet. Med. 6:253-262.
2. Curtis, C. R., H. N. Erb, M. E. White (1988): Prev. Vet. Med 5:293-307.
3. Curtis, C. R., J. M. Scarlett, H. N. Erb, M. E. White (1988): Prev. Vet. Med. 6:43-62.
4. Curtis, C. R., H. N. Erb, M. E. White (1989): Prev. Vet. Med. 7:173-186.
5. Erf, D. F. L. B. Hansen, R. R. Neitzel (1990):J. Dairy Sci. 73:1130-1134.
6. Kaneene, J. B., H. S. Hurd (1990): Prev. Vet. Med 8:103-114.
7. Kaneene, J. B., H. S. Hurd (1990): Prev. Vet. Med. 8:127-140.
8. Muggli-Cockett, N. E., L. V. Cundiff, K. E.Gregory (1992): J. Anim. Sci. 70:2013-2019.
9. Simensen, E. (1982) Acta Agric. Scand. 32:411-419.
10. Simensen, E., K. Norheim (1983): Acta Agric. Scand. 33:57-64.
11. Waltner-Toews, D., S. W. Martin, A. H. Meek (1986): Can. J. Vet. Res. 50:314-317.
12. Waltner-Toews, D., S. W. Martin, A. H. Meek (1986): Prev. Vet. Med. 4:125-135.
13. Waltner-Toews, D., S. W. Martin, A. H. Meek (1986): Prev. Vet. Med. 4:137-158.
14. Waltner-Toews, D., S. W. Martin, A. H. Meek (1986): Prev. Vet. Med. 4:159-171.
15. Waltner-Toews, D., S. W. Martin, A. H. Meek, I. McMillan (1986): Prev. Vet. Med. :103-124.

BOLESTI TELADI: PROCJENA

Sažetak

Prikazana su genetička, ekonomska i epidemiološka istraživanja te smrtnost mliječne, živorođene teladi. Malo je genetičkih i ekonomskih istraživanja bolesti teladi. Opsežna epidemiološka istraživanja u komercijalnim stadima čine temelj odluke koje bolesti istraživati i procjene trajanja zdravlja teladi.

Ključne riječi: bolest teladi, mliječno govedo

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