Health and Productivity of Beef Breeding Herds in Southern Ontario

John J. McDermott, David M. Alves
Neil G. Anderson, *and* **S. Wayne Martin**
Department of Population Medicine
Ontario Veterinary College
University of Guelph
Guelph, Ontario N1G 2W1

Introduction

Between 1986 and 1988 a large observational study of beef cow-calf herds, designed to take a direct approach to investigating practical improvements for Ontario cow-calf producers, was conducted. The major objectives of this study were to estimate health and productivity levels achieved by Ontario cattlemen and to examine which factors might influence these levels. As described in the introductory paper in this series (1), we have monitored 181 randomly selected and 50 volunteer beef cow-calf herds over this period, collecting information on calvings, breedings, deaths, culls, sales, disease occurrence and production information. In addition, annual surveys asked about the major housing, feeding, management and preventive medicine practices on each farm.

In this paper we will focus on the results pertaining to the adult breeding herd from breeding season 1986 to calving season 1987. Unless otherwise stated, we will be referring to the randomly selected herds only. We will describe: how beef breeding herds are currently fed, housed, and otherwise managed; what happens to cows between breeding and the birth of a live calf; and what factors influence pregnancy and culling. Most of our work will focus on herd level information, since beef cows in Ontario and elsewhee are managed as herds rather than as individuals.

Management, Housing and Feeding of Beef Breeding Herds

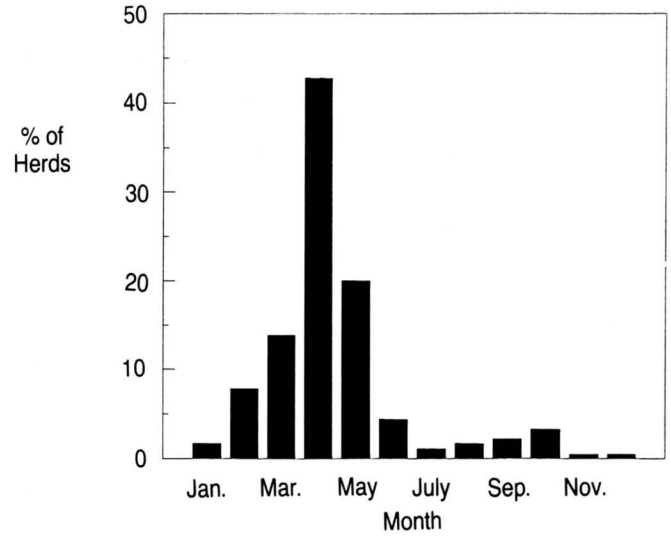
The majority of herds calve in the spring (Figure 1), are bred on pasture in the summer (90%) and wean their calves in the fall. The majority of herds are over-wintered in either yards (57%) or pastures (13%) with access to a barn, while a smaller percentage are overwintered totally outdoors (18%) or totally indoors (11%). During this overwintering period the majority of herds are fed hay based diets with 60% solely on hay and 30% of herds receiving a combination of hay and either corn silage or haylage as the principal forage.

For the most part, Ontario cow-calf breeders do not employ breeding management practices (Table 1) advocated by beef breeding and herd health experts (2,3). Approximately half of Ontario cow-calf herds have no specific breeding season, and of those producers who claimed to have a specific breeding season only 24% restricted breeding to less than 90 days. Only 11.7% of producers bred heifers earlier than the cows.

TABLE 1. Percentage of beef cow-calf herds using specific breeding management practices in a study of Ontario Cow-Calf Herds.

	Percentage of herds
heifers bred earlier	11.7
cows "flushed" pre-breeding	7.2
A.I. used: all	1.1
majority	4.4
some	15.0
specific breeding season: <2 months	8.9
2-3 months	15.0
3-4 months	12.2
4-6 months	13.3
no specific breeding season	50.6

Figure 1. Distribution of Main Calving Month in a Study of Ontario Cow-calf Herds.



Preventive Medicine Procedures

Our estimates of the percentage of Ontario cow-calf herds in which the majority of cows received vitamins,

parasiticides, vaccines or were pregnancy checked are compiled in Table 2. Parasiticides given during the late fall or early winter were the most common product administerd to cows in Ontario beef herds. Cows in 54.2% of herds received a topical systemically acting preparation for external parasites. Routine vaccination of cows was not commonly practiced. The most common vaccine type administered to cows was leptospirosis with 18.2% of herds vaccinated.

Cows were pregnancy checked in 28.9% of herds and heifers in 30.0%.

TABLE 2. Percentage of beef cow-calf herds in which cows received specific preventive medicine procedures in a study of Ontario Cow-Calf Herds.

	Percentage of herds
pregnancy check: cows	28.9
heifers	30.0
injectable vitamins: ADE	3.1
E/Se	1.0
antiparasitics: Ivomec	13.0
Tramisol	5.2
Topical-systemic	54.2
Topical (other)	4.2
Flytags	21.4
vaccines: neonatal scours	15.6
IBR-PI3	14.6
BVD	5.2
pinkeye	0.5
rabies	3.6
leptospirosis	18.2
clostridial	1.0
respiratory (other)	2.1

Productivity: Breeding to Liveborn Calving

Figure 2 illustrates information which can be captured on all cow-calf farms. For each of the outcomes in Figure 2, the average percentage of cows and heifers on a herd basis, classified under that outcome during the breeding season 1986 to calving season 1987 period, are presented in Table 3. Average liveborn calving rates (number of calves born alive/number of females exposed to breeding) in Ontario cow-calf herds are approximately 80% for both cows and heifers. Heifers as a group have a much higher calving rate but their stillbirth rate is three times greater than cows.

We are able to compare our herd estimates to results obtained in a 1983 mail survey of Ontario cow-calf producers (2) (Table 3). The percentages from both these surveys correspond well except on two points, both of which are potential difficulties in cow-calf recording schemes. In our survey the culling rate for cows (10.9%) was more than twice the 1983 estimate (4.9%), presumably due to our ability to uncover problem cows over repeated farm visits. The difference in the calving rate and liveborn calving rate estimates for cows between the two surveys disappears when we subtract both the percentage of cows sold and the increased proportion of culls detected in 1986 from the 1983 estimates. The second discrepancy is in the estimates of heifer stillbirth and abortion rates. The sum of these two categories are similar in the two surveys but most of the heifers classified as aborting in the 1983 mail survey would be classified as stillbirths in the 1986-87 survey.

Figure 2: Easily defined outcomes from breeding to liveborn calving.

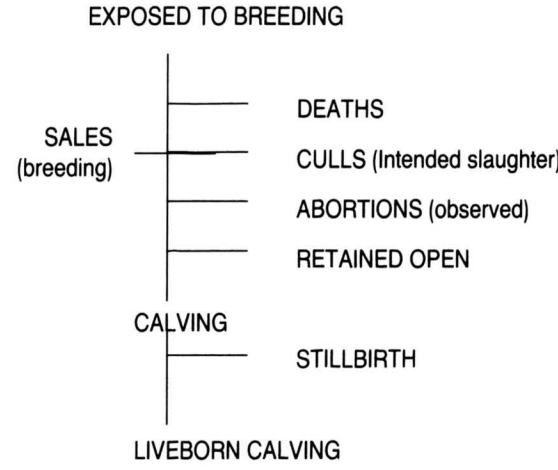


TABLE 3. Mean herd proportions of post-breeding outcomes for cows and heifers in Ontario Cow-Calf Herds, 1986.

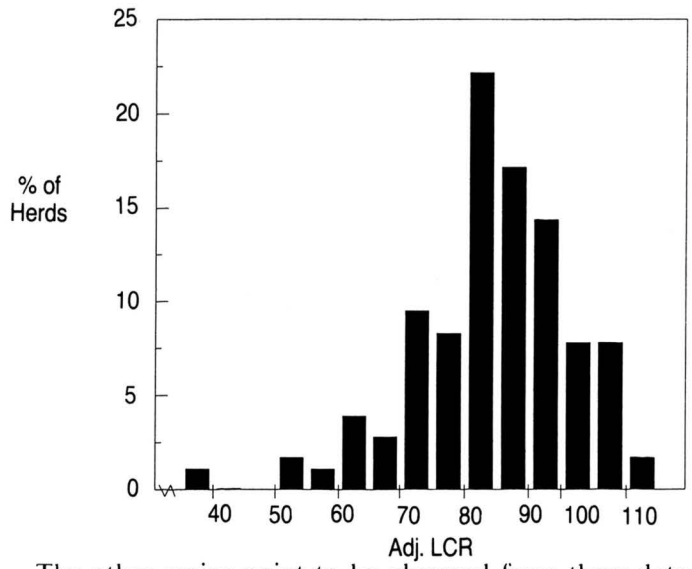
	Cows		Heifers	
	Herd Mean	Prev. Herd Mean[a]	Herd Mean	Prev. Herd Mean[a]
Culled	10.9	4.9	3.9	5.7
Sold	2.6	n.d	2.8	n.d.
Died	0.6	0.7	0.4	0.4
Abortion (observed)	0.8	1.0	0.1	2.7
Retained Open	3.3	2.6[b]	4.0	6.4[b]
Twinning Rate	1.9	n.d.	0.6	n.d.
Calving Rate[c]	83.7	91.4	89.4	84.6
Stillbirth Rate	2.4	1.6	7.4	3.4
Liveborn calving Rate[d]	81.3	89.8	82.0	81.2

[a]- data from Rogers et al, 1985.
[b]- were labelled as unexplained, most on follow-up were retained open.
[c]- number of calves born/number of females exposed to breeding.
[d]- number of calves living >24 hours/number of females exposed to breeding.

Of greater interest than average herd rates for calving and live-born calving are the proportion of herds achieving rates either above or below an appropriate target. Figure 3 displays the distribution of herds at various levels of adjusted liveborn calving rates (the adjustment is to subtract cows sold as breeding stock from the denominator of cows exposed to breeding). Over 75% of herds achieve adjusted liveborn calving rates in excess of 80%. This indicates that

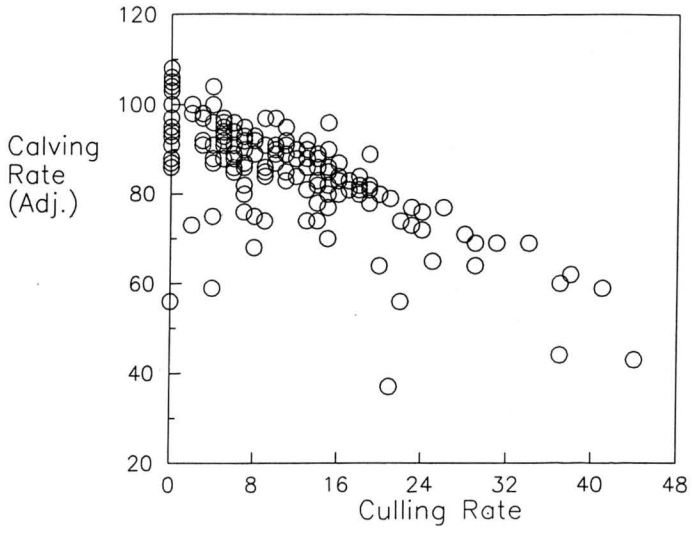
while in general cow-calf producers in Ontario enjoy good breeding and calving success, there are approximately 20% of producers who do not.

Figure 3. Distribution of Adjusted Liveborn Calving Rate in a Study of Ontario Cow-Calf Herds.



The other major point to be observed from these data is that summary measures of success such as calving rate, which can be influenced by a number of factors, are often too simplistic and must be broken down into their component parts. As can be seen in Table 3 the major influence on calving rate is culling rate. Figure 4 demonstrates graphically the linear relationship (r = -.76) between culling rate and calving rate. While culling is viewed as a negative event in calving rate accounting, this is not always an appropriate approach. Herd culling rate involves components of both individual and herd failures (non-pregnancy, disease) and overall herd management policy (changes in herd size, genetic selection pressure).

Figure 4. Relationship Between Adjusted Calving Rate and Culling Rate in a Study of Ontario Cow-calf Herds.



Factors Influencing Culling Decisions

Both individual cow and herd level management factors influence culling decisions. We have investigated the risk of culling for 2330 beef cows in 50 veterinary client herds in our study, from calving 1986 up to (but not including) calving season 1987 (5). If we assumed that each cow in all the fifty herds had an independent chance of being culled then a number of expected risk ractors for culling such as non-pregnancy, increased age, assistance at calving, calf losses prior to weaning, lower 1986 calf weaning weight index and the occurrence of abortion, mastitis, prolapsed vagina and prolapsed uterus during this period were all associated with an increased risk of culling. However, if we adjust for potential analytic complications such as the possibilty that cows in the same herd will have related risks of culling, we find that only non-pregnancy, increased age and perhaps calf losses prior to weaning remained associated. While this latter analysis may not be powerful enough to detect an increased culling risk due to disease (since abortion, mastitis, prolapsed vagina and prolapsed uterus all have incidence rates of less than 1% per year) the lack of association between increased culling and poor calf weaning weight was not surprising.

In fact, our data suggest that different producers will cull cows with the same individual risks factors at quite different rates. Higher herd culling rates were associated with more intensive management practices including individual animal identification, records used for management and pregnancy checking. A number of manager characteristics were also associated with increased herd culling rates, including manager was the farm owner, longer experience, university education, and "off-farm" employment. Lower herd culling rates were found in more extensively managed herds where cows were overwintered without access to buildings and cows were bred year-round. No differences between herd culling rates in purebred versus commercial herds or in AI versus naturally bred herds could be found. Surprisingly culling rate was also not associated with the proportion of females bred which were heifers.

Factors Influencing Pregnancy Rate

A component part of calving rate which is of fundamental interest is pregnancy rate. Our analyses of pregnancy rate have focused on what herd level factors of potential biological importance influence the herd pregnancy rate. We need to be cautious in our interpretation of these analyses since only 28.9% of herds were pregnancy checked in 1986.

Some factors which appear to be associated with higher herd pregnancy rates are access to outdoors during the overwintering period, smaller numbers of breeding females per bull, larger pastures and increased number of days in which pasture was supplemented by other feeds. Lower

herd preganncy rates are associated with feeding extra grain to cows prior to the breeding season and to longer breeding seasons. Both of these latter findings seem contradictory to what we would expect biologically. Perhaps producers expecting low pregnancy rates for other reasons flush cows and extend the breeding season in an unsuccessful attempt to compensate.

Summary

The results presented in this paper represent preliminary analyses on data from the first year of the project. Over the next year, we expect to investigate a number of additional questions both in all study farms and within specific subsets of study farms. Additional information collected on bulls and pastures will also be incorporated.

In the context of this year's conference theme of "Preparing and Selling Yourself in a Time of Changing Bovine Practice" we feel that a few of our preliminary findings bear emphasis. A particularly valuable aspect of this study is that health and production of beef breeding herds is being investigated not just in experimental station or volunteer herds but in random sample of herds. This not only provides us with a glimpse of more "average" herds, but also leads naturally to a greater emphasis on farmers' management goals and strategies. As can be seen from our preliminary work, cow-calf farmers are not a homogenous group. Herd culling rates are influenced by a number of identifiable manager and management factors. Although considering the producer's goals is cited as a component in the delivery of cow-calf herd health program (6), we fear that the importance of this concept is underestimated.

Two groups of cow-calf producers are likely to be of principal interest to veterinarians. The first group consists of those producers who manage more intensively and are prepared to incorporate additional information such as pregnancy check results into their decision making. The second group includes those producers whose herd productivity is noticeably poorer than average, in our study approximately 20% of herds based on adjusted live-born calving rates. Reaching this group will provide a big challenge but the potential benefits both for them and for us are large.

Acknowledgements

This research project was funded by the Ontario Ministry of Agriculture and Food (OMAF) and could not have been conducted without the cooperation of the randomly selected and volunteer cow-calf producers and the participating veterinarians. We wish to thank Mr. Mark Gignac for valuable computer assistance and the staff of the Red Meat Centre, OMAF. The senior author is a fellow of the Medical Research Council of Canada.

References

1. Martin, S.W., McDermott, J.J., Alves, D.M., and Anderson N.G. Bench-Mark: A Beef Cow-Calf Production and Health Monitoring System. Proceedings of the 21st Annual Conference of the American Association of Bovine Practitioners. Calgary, Alberta, Canada. October 1, 1988. in press. 2. Wiltbank, J.N. Maintenance of a High Level of Reproductive Performance in the Beef Cow Herd. Veterinary Clinics of North America: Large Animal Practice. Vol. 5, No. 1, March 1983. pp 41-57. 3. Mossman, D.H. Analysis of Calving. Proceeding No. 68. University of Sydney, Post-Graduate Refresher Course for Veterinarians, Beef Cattle Production. 1984. pp 201-213. 4. Rogers, R.W., Martin S.W., and Meek A.H. Reproductive Efficiency and Calf Survival in Ontario Beef Cow-Calf Herds: A Cross-sectional Mail Survey. Can J Comp Med 1985; 49:27-33. 5. McDermott, J.J., Lesnick, T.G., and Martin, S.W. The Analysis of Individual Animal Risk for Animals Sampled in Clusters. Proc. Vth ISVEE Symposium, Copenhagen, Denmark. July 1988. in press. 6. Radostits, O.M. and Blood D.C. Herd-Health. W.B. Saunders Co., 1985. pp 202-243.