The 1986-1987 Performance of Replacement Beef Heifers in 76 Ontario Cow-Calf Herds

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Introduction

Over seventy thousand yearling beef heifers entered the Ontario beef breeding herd in the 1986 season. This crop of heifers differs from previous years in that the performance of a fraction of their lot received far more detailed scrutiny than that of any predecessors. An earlier mail survey (1) identified a need to quantify and understand replacement heifer management programs and the resulting performance under Ontario conditions of husbandry and environment. Indeed, this information was deemed essential prior to formulating strategies for advancement of productivity.

Analyses at both the herd and individual heifer level were considered necessary to understanding replacement heifer performance and both will be reported in this introductory paper. In particular, a study of the role of weaning weight and yearling weight as a determinant of beef heifer productivity was a major part of the project. A description of the selection, breeding, and calving strategies employed by managers and the calculation of monitors of replacement heifer production from breeding to weaning of their first progeny should provide useful comparisons for Ontario farmers and their advisors.

Materials and Methods

All herds in this report originated from the randomly selected herds in the Benchmark project referred to by Martin et al (2). Herds with five or more first bred heifers were included in the study. The size restriction was imposed to permit calculation of herd level proportions using a sufficiently large denominator.

Eight-seven herds (about one half) met these criteria. Within these herds, individual heifers with questionable birth dates or identifications, were excluded. In addition, heifers purchased prior to calving and those sold as bred were excluded for analysis purposes. Of the 789 heifers presented in the 76 herds, 756 remained in the sample. The average herd size was 53 breeding females expected to calve in 1987, and 21% of the breeding females were replacement heifers.

Description of the First Bred Heifers

The majority of heifers were cross-bred. To permit comparisons over this potentially important factor, the heifers were assigned a weight related breed type classification of small, medium, or large based on reports found in the standard text by Minish and Fox (3). Table 1 highlights the breed type and weight information. Eighty-seven percent of the heifers had type and weight information. Eighty-seven percent of the heifers had weaning weights and 65% had yearling weights. The mean adjusted weaning weight of the progeny was very similar to that of their dams at 532 pounds.

Table 1. Breed Types and Mean Adjusted Weights of the First Bred Heifers in 76 Ontario Herds, 1986.

	Percentage	Mean Weight (pounds)	
1. Small Breed Type	39		
Adjusted Weaning Weight		515	
Adjusted Yearling Weight		761	
Adjusted Mean Gain		246	(1.5 lbs/day)
2. Medium Breed Type	35		
Adjusted Weaning Weight		533	
Adjusted Yearling Weight		772	
Adjusted Mean Gain		239	(1.4 lbs/day)
3. Large Breed Type	26		
Adjusted Weaning Weight		581	
Adjusted Yearling Weight		854	
Adjusted Mean Gain		273	(1.7 lbs/day)

Description of Breeding and Calving Management Practices

The breeding and calving management practices shown in *Table 2* give some insight into strategies used by managers to achieve success. Available weaning weight was infrequently used as a primary selection criterion. The frequency of adoption of the three tenets of replacement heifer management, namely, raise heifers separately from the cows, breed heifers for a short specific period, and breed heifers earlier than the cows, is also noteworthy (4). Future analyses may indicate which practices prove most successful under Ontario conditions.

Table 2. Breeding and Calving Management Practices for Replacement Heifers in 76 Ontario Beef Cow-Calf Herds, 1986-87.

	Percentage of Herds
1. selection of replacements	
a. between weaning and yearling	81
b. primary reason - size	33
c. primary reason - weight gain	21
d. primary reason - maternal performance	21
e. primary reason - conformation	17
2. target calving age - 2 years	82
3. raised separate from cows	56
4. specific breeding period	60
5. bred earlier than cows	20
6. used bull known to leave smaller calves	60
7. natural service exclusively	80
8. artificial insemination exclusively	9
9. fed grain prior to breeding period	32
10. fed protein supplement prior to breeding period	24
11. fed grain during breeding period	15
12. fed protein supplement during breeding period	4
13. calved cows and heifers in same location	63
14. heifers given more observation at calving	75

Monitors—Breeding to Weaning

Ninety-four percent of those exposed to breeding delivered a calf (calving rate), 88% delivered a live calf (liveborn calving rate), and 84% weaned a calf (net weaned calf crop).

Success of Breeding

The mean calving age of all heifers was 26 months with 85% of heifers calving at less than 30 months of age. Small breed type heifers calved one month younger at 25 months and medium and large breed type heifers calved one month older at 27 months of age.

Recall that 94% of the heifers exposed to breeding calved, leaving a 6% loss. Of this 6% reproductive wastage from breeding to calving, 3% non-pregnant heifers were culled and 2.5% non-pregnant heifers were retained for rebreeding.

A comparison of mean adjusted weaning and yearling weights for barren and pregnant heifers revealed them to be similar within all breed types. The mean adjusted weight gain from weaning to yearling differed for barren vs pregnant heifers within the large and medium breed type (Table 3). The barren heifers within the large breed type had a mean adjusted weight gain of 297 pounds (1.8 pounds per day) compared to a lesser mean gain of 248 pounds (1.5 pounds per day) for the pregnant and calved heifers (P=.04). In contrast, the barren heifers of the medium breed type had attained a mean adjusted gain of 181 pounds (1.1 pounds per day) compared to a greater gain of 229 pounds (1.4 pounds per day) for the heifers that calved (P=.02).

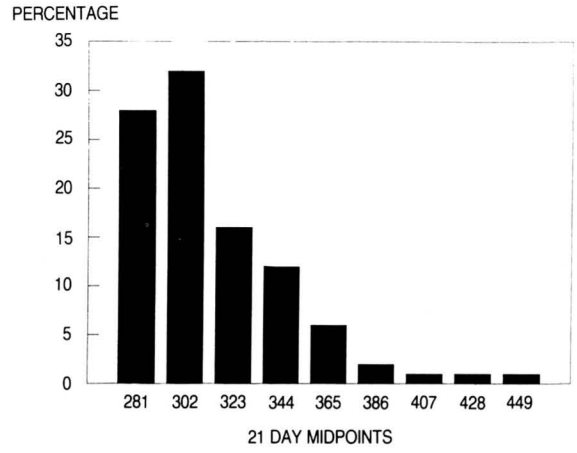
Table 3. The Difference in Mean Adjusted Weight Gain Barren vs Calved Heifers, in Ontario, 1986-87.

		Number	Mean Gain	Difference (pounds)
Large Breed Type	Barren	9	297	
	Calved	112	248	49
Medium Breed Type	Barren	13	181	
	Calved	153	229	-48

(the difference in gain is significant at P<.04)

The percentage of heifers calving over three week intervals (plus 280 days gestation) from first exposure to a bull provides us with some insight into the sexual maturity of the heifers in the group. The mean interval was 314 days and was similar for all breed types. From the histogram (Figure 1) note that 60 percent of the heifers had estrous and conceived within the first 6 weeks of exposure. An additional three estrous cycles were needed to achieve a 95% in calf rate for this group. No doubt the long exposure period for heifers contributed to the success of breeding. It should be apparent that a universal decision by all managers to remove bulls after 9 weeks of exposure would have proved disastrous for overall calving rate because 25% of the heifers did not conceive until the time for three estrous cycles had elapsed. Delaying the start of breeding in some herds would be required to ensure maximum numbers of heifers pregnant in a short breeding period management system.

Figure 1. Histogram of Exposure to Calving Interval for 465 Ontario First Progeny Heifers.



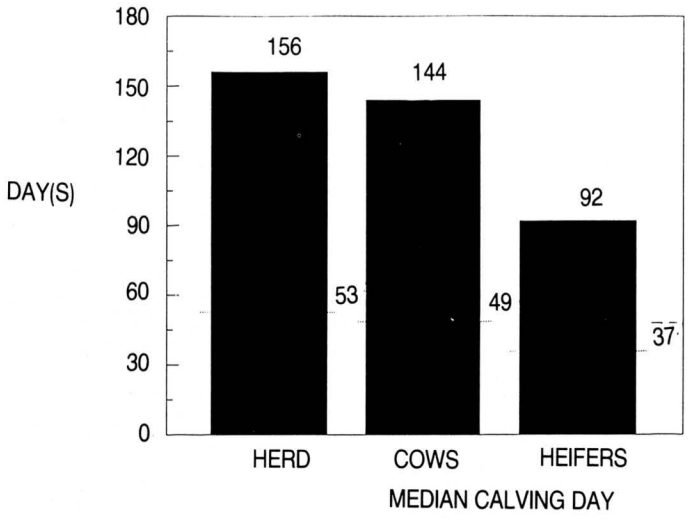
The large breed type heifers with a mean adjusted weaning weight of 564 pounds were more commonly in calf in the first six weeks of bull exposure than the large breed type heifers averaging 617 pounds (P=.006). Additionally for large breed type heifers, those exposed at 18 months of age were more likely to be in calf in the first six weeks of exposure to a bull than those heifers exposed at 15 months of age (P=.003). Further analyses

may reveal explanations of the differences.

Calving spread describes the period in days over which all females, all cows, or all heifers calve. Median calving date is the date at which fifty percent of the females, the cows, or the heifers have calved and is used to determine median calving day. Both monitors are useful for investigating the achievement of concentrated calving (5).

Figure 2 illustrates the mean spread of calving and the average median calving day for the study herds. Comparing calving spread on a herd basis for all females, for cows, and for heifers revealed an average span of 156 days for herds, 144 days for the cows and 92 days for the heifers. The average median calving day was 53 for the herds, and 49 for cows and 37 for heifers. The heifers calved over a shorter span and in a more concentrated pattern than the cows. Thirteen percent of herds calved all cows in 60 days or less, while 35% of herds calved all heifers in that time frame.

Figure 2. Histogram of Mean Calving Spread and Medium Calving Day for 76 Ontario Beef Herds.



Success of Calving

A stillborn calf was defined as a calf born dead or one which died within 24 hours after birth. A stillborn rate of 7% accounted for the greatest portion of calf wastage totaling 9 percent. Once born alive, the progeny of first calf heifers experienced losses of two percent to weaning with half of this being in the first month of life. Some differences in calf wastage by breed type were noted. The small breed type heifers experienced 12% calf wastage which was significantly greater than the 6% for medium (P=.03) and 7% for large (P=.10) breed type heifers.

Mean adjusted weaning weight and mean adjusted yearling weight were similar for heifers delivering stillborn and liveborn calves within all breed types.

Differences in mean adjusted weight gain from weaning to yearling were noted for large breed type heifers delivering stillborn and liveborn calves. The heifers delivering stillborn calves had an average gain of 307 pounds (1.85 pounds per day) compared to a lesser gain of 244 pounds (1.5 pounds per day) for heifers delivering live calves (P=.06). No differences in mean gain existed for heifers of small and medium breed type delivering stillborn and live calves.

By choice or by necessity, managers assisted 25% of all heifers at parturition with the majority of assistance being classified as easy pulls. The frequency of assistance for large breed type heifers was greater at 32% than for small breed type at 23% (P=.05) and medium breed type at 22% (P=.03).

The percentage of assisted deliveries classified as easy, hard, malpresentation, and veterinary assisted were similar for small and large breed type heifers. There were some differences between these two breed types and the medium breed type heifers. The medium breed type heifers received fewer easy assisted deliveries at 31% compared to 56% easy assists for large (P=.02) and 58% easy assists for small (P=.01) breed type. While the medium breed type heifers received 52% hard assisted deliveries compared to 31% hard assisted deliveries for the large and small breed types, these differences were not statistically significant.

Two percent of deliveries received veterinary assistance, indicating the minimum of veterinary expertise required during the calving season. The overall rate of assisted delivery may be a reflection of the extra attention given these heifers to assure success at calving.

A comparison between heifers calving at less than 26 months of age and those calving at greater than 30 months of age revealed no difference in rates of stillbirths or assisted delivery.

Assistance at delivery, in addition to being a labour input, proved to be a risk factor for stillborn calves. Calculation of odds ratios using all first progeny heifers showed the risk of stillbirth to be five times greater with an assisted delivery (P=.0001). When investigated by breed type, an odds of 17:1 of stillbirth following assisted delivery of medium breed type heifers (P<.0001) was about four times the risks shown by small and large breed types. We will be looking for an answer for this when we return to analyzing the data.

Production Efficiency

A measure of production efficiency capturing the useful outcome of weight of calf weaned and the total inputs of management through to first progeny weaning is 'net weaned weight.' Net weaned weight is calculated by dividing the 'total pounds adjusted calf weight' by the 'number of replacements exposed to breeding' having adjusted for precalving sales of bred heifers and postcalving sales of heifers and their progeny in the denominator. This production monitor provides a ratio measure of adjusted

pounds of calf weaned per heifer exposed to breeding and captures the efficiences and inefficiencies of replacement heifer management.

The group of 756 heifers described in this report produced 418 pounds of calf per heifer exposed to breeding. Whereas the mean adjusted weaning weight for the first progeny calves of 532 pounds might have some appeal for 'boasting' about success, the net weaned weight has greater utility for monitoring the true success of replacement heifer management programs.

Conclusion

The material presented represents a small fraction of that collected on the study farms. The dataset includes individual heifer data as well as herd level data on feeding, housing, and preventive medicine measures. We know our replacement heifers experience reproductive wastage of six percent from breeding to calving and calf wastage of another ten percent to weaning. Our next challenge is to find answers to why this occurs and how to decrease the loss. Farm managers and their advisors can then begin to reinforce successful management practices and to formulate new strategies to achieve higher productivity for Ontario's replacement heifers.

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