THE INFLUENCE OF A HEALTH PROGRAM ON DAIRY HEIFER PRODUCTIVITY IN MINNESOTA

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Introduction

It has been previously noted[8] that heifers, although they represent the future production potential of herds, were commonly the most neglected group of animals on Minnesota dairy farms. Many calved at ages far beyond the recommended 24 months and 28 months was the average calving age of heifers entering the Minnesota Dairy Herd Improvement Association (DHIA) record system[1]. On the other hand it was not unusual for the author to observe large and well grown heifers that had not been bred on farm visits.

Heifer raising costs in Minnesota were estimated at $1353 to 24 months of age while beyond this the cost increased to $1.92 per day.[7] A partial farm budget[8] for an average Minnesota dairy herd estimated a potential gross benefit of $5,548 from all heifers achieving first calving at 24 months. Yet when this study started few preventive medicine and monitoring techniques for heifers were used in Minnesota, so there appeared to be a potential to profitably influence heifer raising programs.

A clinical trial[8] to evaluate a co-ordinated delivery of preventive medicine procedures to heifers was designed. The project's major aim was to determine the influence of several intervention procedures delivered as a heifer health program on growth, survival and productivity. A second aim was to document the growth and survival of heifers on some Minnesota dairy farms, since little or no documented information was available.

Materials and Methods

The project was conducted on 36 dairy farms having Holstein cattle in 3 counties near Minneapolis and St. Paul, Minnesota. Herds were stratified by size and summer pasturing practices, then randomly allocated to a treatment or control group. A study using a treatment and control groups within each farm was logistically infeasible whilst funding limitations prevented a design where farms were the unit of observation.

The trial was conducted from April 1984 through December of 1987 with heifers born in the 1984 calendar year being the cohort examined. Eleven treatment group farms starting with 198 heifers and 14 control group farms starting with 341 heifers, completed the project. Three treatment group herds were excluded because they would not allow rectal examination, repeatedly did not present heifers for examination, or asked to withdraw. In the control group, one herd asked to withdraw. All other herds withdrawing from the project participated in the dairy herd buyout program sponsored by the US Federal Government.

The operation of the project has previously been detailed[8] and will thus be summarised here. Herds were visited every three months; the treatment group by the author and an assistant, the control group by the same assistant and a county extension agent. The assistant ensured that similar monitoring technique was used in both groups of herds. Heifers aged 3 months initially and then from birth entered the project. Monitoring continued until calving, sale or death.

Growth monitoring evaluated heifer height and weight against age appropriate target levels.[4] Wither heights were measured using growth sticks, weights using girth tapes[6] and condition scores on a scale of 1 to 8.[5] These were entered to a computer record system which produced reports

plotting height and weight against age over growth curves derived from.[4] Deviations from the target growth patterns in treatment group herds were investigated as to causes. Where possible causes were corrected to get heifers back on target for growth.

Treatment group heifers in the project were scheduled to be vaccinated twice with an 8 component vaccine including modified live virus strains of IBR, BVD and PI3 combined with 5 strains of Lepto bacterin (Resbo-8, [R] Norden Laboratories). Vaccinations were due at visits occurring when they were between 6 and 9 months and again between 12 and 15 months old. However heifers running with pregnant cows or heifers were not vaccinated in view of the possible risk of precipitating the disease of Bovine Virus Diarrhea.[2] The majority were thus vaccinated only once at between 6 and 9 months.

Treatment for internal parasites occurred twice, 4 weeks apart in spring or early summer with fenbendazole (Panacur (R), Hoechst-Roussel Agrivet Co.). Recommended doses were used based on the estimated weight from girth tape measurements.

Treatment group heifers were examined by rectal palpation of the genital tract if no heat was observed by the 15th month of age, if inter-estrous intervals exceeded 35 days in the pre-visit period, or if heat was not observed after breeding when more than 35 days had elapsed between breeding and the visit date.

A heifer recording and reporting system developed as an addition to a previously described dairy herd health computer program[3], was one of the treatments applied to the heifer treatment group in this project.

Information from control and treatment groups was recorded at the three monthly visits, coded, and entered to the computer program. Only the treatment group information was regularly monitored as the project progressed. Treatment group farmers only, received reports and recommendations from project personnel. Only monitoring occurred on control group farms.

Results

The heifer health and management program described herein significantly decreased the average age at calving of treatment group heifers. Heifers in the treatment group calved at 797 days compared with 865 days in the control group so first calving was 68 days (P <0.0001) earlier for the treatment group (Table 1). Since the average age at calving differed significantly between groups, they could not be directly compared for height and weight but growth rate to calving could be. It was 0.06 kilograms per day (P <0.0001) higher in the treatment group, with less variation being evident than in the growth rate of control group animals. Condition scores did not differ significantly between groups (P>0.10).

The heights and weights of the heifers in the two groups were compared at 15 months of age. The average height and weight of the heifers in the treatment group was 3.85 centimeters and 14.8 kilograms (P <0.001) greater than those in the control group.

The program had a significant effect on the occurrence and recording of estrus. The mean age at first recorded heat was 474.5 days in the treatment group, compared to 580.1 days in the control group (P<0.0001).

The number of animals disposed of before calving differed significantly (P <0.0004) between the control and treatment groups. Of the treatment heifers, only 12.6% were lost through sale or death, while 24.6% of the control heifers were. The death loss in the treatment group was 6/198 and in the control group was 16/341 (P = 0.003). Twenty-five treatment group heifers were removed before calving at a mean age of 538.2 ± 243.9 days. Eighty-two control group heifers were removed before calving and their mean age at removal was 632.6 ± 345.0 days. Heifers held in confinement or in lots had a significantly lower mean age at calving (P <0.0185) and a higher growth rate (P <0.0001) than those which spent the summer at pasture (Table 2). Treatment and control groups were similarly distributed between pasture and non-pasture environments. Pastured animals exhibited lower weight gain than those that were not pastured. Non-pastured animals gained an average of 43.0 kilograms more than pastured animals, and grew an average of 3.05 centimeters taller.

TABLE 1.

Age (days), Height (cm), Weight (kg), Condition Score and Growth (Kg. per day) for Treatment vs. Control Groups at Time of Calving.

Measure	Treatment (mean)	(s.d.)	n	Control (mean)	(s.d.)	n	P-value
First Heat							
Age	474.55	80.21	182	580.14	131.31	237	0.0001
Height	121.84	5.36	182	124.21	5.61	237	0.0001
Weight	367.61	58.36	182	406.32	69.06	237	0.0001
Cscore	4.75	0.69	181	4.76	0.56	237	0.7609
First Service							
Age	501.71	63.21	181	589.36	123.93	237	0.0001
Height	123.22	4.70	181	124.66	5.38	236	0.0001
Weight	387.96	44.99	181	411.91	66.58	236	0.0001
Cscore	4.83	0.69	180	4.79	0.56	236	0.7743
Conception							
Age	518.81	72.34	171	655.96	152.13	71	0.0002
Height	123.90	4.83	171	126.67	5.18	70	0.1784
Weight	400.00	51.83	171	439.63	60.06	70	0.0875
Cscore	4.88	0.70	171	4.90	0.46	70	0.7294
Calving							
Age	797.55	73.37	172	865.24	123.08	249	0.0001
Height	133.12	4.42	169	133.45	4.52	245	0.1742
Weight	556.58	58.02	170	554.23	64.06	245	0.0036
Cscore	4.78	0.66	165	4.83	0.61	242	0.0812
Growth Rate	0.744	0.141	192	0.685	0.172	308	0.0001

Discussion

The heifer health and management program applied in this project improved the raising of heifers. The specific program components that improved performance cannot be identified since the program was provided as a total package. The anthelmintic treatments probably improved the weight gain of heifers in the treatment group and could explain the lack of difference in weight gains between pastured treatment group heifers and confined treatment group heifers. Weight gain in pastured control group heifers differed significantly from that of confined control group heifers.

A major benefit of the project was that farmers participating in it were required to view their heifers at least once each three months. This occurred with both the treatment and control herds, so the control group may have benefited from this. If so, the estimates of the benefit provided by the program will be conservative.

Farmers were very willing to spend the time required to conduct the procedures involved with their heifers. The graphical heifer growth output that compared their herds to standard curves strongly motivated the farmers to improve the growth performance of their heifers.

The most common faults observed in participating herds were inadequate and imbalanced rations, mixing of animals of a wide size range in one group due to inadequate housing facilities, housing of heifers with cows, and inadequate attention to the condition of pastured heifers. The implementation of a heifer health and management program, by addressing these common problems,

can significantly improve heifer growth performance and can help to achieve earlier calving in heifers. The program greatly influenced survival of heifers, as well as their growth rate until first calving.

TABLE 2.

Age, Height (cm), Weight (kg), Condition Score, Growth for Pastured vs. Non-Pastured Heifers at the Time of Calving.

	Pastured			Non-Pastured			
Measure	(mean)	(s.d.)	n	(mean)	(s.d.)	n	P-value
First Heat							
Age	550.97	123.91	292	495.89	114.27	127	0.0002
Height	122.89	5.77	292	123.85	5.26	127	0.9799
Weight	386.38	62.64	292	390.44	77.36	127	0.9379
Cscore	4.17	0.61	292	4.86	0.64	126	0.0001
First Service							
Age	562.39	113.85	292	525.95	99.74	126	0.0033
Height	123.44	5.44	291	125.37	4.27	126	0.2814
Weight	397.14	57.31	291	411.61	62.74	126	0.1272
Cscore	4.78	0.63	291	4.88	0.60	125	0.0004
Conception							
Age	572.43	133.61	169	528.05	70.12	73	0.0238
Height	124.23	5.59	168	125.83	3.38	73	0.7236
Weight	412.68	61.47	168	408.84	45.91	73	0.6669
Cscore	4.94	0.64	168	4.75	0.62	73	0.9855
Calving							
Age	849.70	114.71	277	814.29	98.71	144	0.0185
Height	133.12	4.83	273	133.71	3.68	141	0.5738
Weight	549.40	62.78	273	566.26	57.87	142	0.8716
Cscore	4.81	0.62	267	4.80	0.656	140	0.2050
Growth Rate	0.658	0.152	323	0.794	0.15	177	0.0028

Summary

A clinical trial compared health, reproduction, growth and production performance of Holstein heifers provided with a health and management program to that of traditionally managed

heifers. The program involved vaccination, worming, reproductive and growth monitoring backed by a computer based record system. Visits each 3 months allowed measurements to occur and treatments to be given to the treatment group.

The program reduced age at calving by 68 days ($P < .0001$) and increased growth rate by 0.06 kg per day ($P < 0.0001$). Heifer disposal was reduced in the treated group with 12.6% of heifers being sold or dying compared with 24.6% in the control group ($P < 0.0004$). Removal of treatment group heifers was 90 days before removal in control group heifers.

The program which was evaluated improved production efficiency in heifer raising.

Zusammenfassung

Im Rahmen eines klinischen Studie wurden Gesundheits-, Reproduktions-, Wachstums- und Produktionsparameter von Holstein - Färsen verglichen, die nach traditionellen Methoden bzw. unter Benutzung eines Tiergesundheitsprogrammes gehalten wurden. Das Programm bestand aus Impfung, Entwurmung, Reproduktions- und Wachstumsüberwachung unter Einbeziehung einer computerisierten Datenbank. Die Behandlungen und die Messungen der einzelnen Parameter wurden im Abstand von 3 Monaten durchgeführt.

Das Erstkalbungsalter konnte durch das Tiergesundheitsprogramm um 68 Tage ($p < 0.0001$) reduziert und das Wachstum um 0.06 kg pro Tag ($p < 0.0001$) erhöht werden. Verluste durch Verkäufe und Todesfälle konnten bei den Färsen auf 12.6% in der behandelten Gruppe verglichen mit 24.6% in der traditionell gehaltenen Gruppe reduziert werden. Diese Tiere konnten in der behandelten Gruppe 90 Tage eher als die Kontrollgruppe identifiziert werden.

Das Tiergesundheitsprogramm trug zu einer Erhöhung der Produktivität bei Färsen bei.

Resumen

Un ensayo clinico comparó salud, reproducción y comportamiento productivo de novillas Holstein bajo un programa de manejo y salud con aquellas sometidas a un manejo tradicional. El programa involucró vacunación, desparasitación y monitoreo reproductivo y de crecimiento apoyado en un sistema de records computarizado. Las visitas fueron hechas cada tres meses lo cual permitió que se hiceran las mediciones y tratamientos correspondientes en el grupo tratado.

El programa disminuyó en 68 días la edad al parto ($P < .0001$) y aumentó el ritmo de crecimiento en 0.06 kg por día ($P < 0.0001$). El desecho de novillas se redujo en el grupo tratado con respecto al grupo control. 12.6% de las novillas tratadas fueron vendidas o murieron en comparación con 24.6% en el grupo control ($P < 0.0004$). La eliminación de novillas en el grupo tratado ocurrió 90 días antes que en el grupo control.

El programa evaluado mejoró la eficiencia productiva en el levante de novillas.

References

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