

A PRELIMINARY STUDY OF THE EFFECT OF PRE PARTUM SUPPLEMENTATION ON REPRODUCTION IN HOLSTEIN HEIFERS

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With the aim of studying the residual effect of pre partum supplementation on post partum reproduction, a total of 34 Holstein heifers were randomly placed on two treatments: 45 days before estimated calving date 17 of the pregnant heifers received an additional 2 kg of concentrate with 16% crude protein until calving; the rest continued on the feeding regime according to the NRC recommendations. After calving both groups were fed in accordance with their milk production.

The animals were weighed weekly throughout the gestation and 2 days before and after calving, then they were weighed when they showed first post partum oestrus and every fortnight subsequently until conception. The detection of oestrus was carried out by visual observation twice a day before each milking, and the heifers were inseminated artificially 12 hours after the onset of oestrus.

Although there were no significant differences ($P > .1$) in the variables considered, it was possible to observe a tendency towards a reduction in the period between calving and first oestrus (70.2 ± 33.2 vs 96.6 ± 40.5 days) and conception (111.1 ± 30.0 vs 129.9 ± 62.3 days) in the group that was supplemented, which also had a higher pre partum weight (535.2 ± 33.6 vs 492.3 ± 57.4 kg) and post partum weight (468.7 ± 33.2 vs 417.0 ± 39.8 kg). It is proposed that the response obtained was a consequence of the different ability of the heifers in each group to mobilise body reserves after calving.

Key words: Holstein cattle, reproduction, supplementation

Practical observations indicate that an increase in the level of nutrition of cows during the last 6 weeks of gestation results in an improvement in post partum reproductive performance (Wiltbank et al 1965; Bodisco et al 1976), and an increase in milk production during the initial phase of the following lactation (Blaxter 1944; Bonnier 1946; Flux 1950; Martínez et al 1978). Reid et al (1964) observed that when heifers were reared to first calving on a high plane of nutrition there was no significant improvement in reproductive and productive performance during the first lactation and the four following lactations. The objective of this work is to study the influence of pre partum supplementation on productive and reproductive parameters in Holstein heifers.

Materials and Methods.

34 Holstein heifer calves were reared according to the nutritional requirements recommended by the National Research Council (NRC) for all nutrients until they became pregnant. At this point they were randomly divided into two groups of 17 each and housed in separate corrals where they were offered fresh grass and water ad libitum plus 2 kg/d of a concentrate with 16% crude protein (CP). 45 days before the estimated calving date, one

group of heifers was given an additional 2 kg of the same concentrate per day until calving. After calving the heifers were grouped together again and fed according to the NRC recommendations. The level of concentrate supplementation was according to the level of milk production.

The animals were weighed weekly during the whole gestation period and 2 days before the estimated calving date and at calving. Heat detection was carried out twice a day and the animals were served using artificial insemination 12 hours after the start of oestrus.

The data was analysed using the least squares technique and significant tests were based on the normal t distribution.

Results

The uniformity of the heifers from birth to conception can be seen in Table 1. In effect there were no significant differences between the

Table 1:

Age and liveweights at first service and conception and the number of services per conception for the experimental Holstein heifers.

Experimental group	Interval between birth and				Number of services per conception
	Age	First service Weight	Age	Conception Weight	
Prepartum supplementation	539.0 ± 29.9	376.5 ± 26.2	586.1 ± 84.7	388.8 ± 30.3	2.70 ± 2.17
Without prepartum supplementation	559.1 ± 80.7	369.8 ± 28.5	581.7 ± 101.1	377.6 ± 29.3	1.74 ± 1.22

groups in age at first service (539 vs 559.1) or age at conception (586.1 vs 581.7 days). Liveweights also varied very little. Liveweights at first service were: 376.5 vs 369.8 kg for the group that was later to receive supplementation before calving and that which did not, respectively. Regarding weight at conception those heifers that later received supplementation before calving weighed an average of 388.8 kg while the other group weighed an average of 377.6 kg. The animals that were later supplemented before calving required an average of 2.70 services per conception, while the group that later were not supplemented required an average of 1.74 services per conception. It is always possible that a non significant difference between two characters is due to the insufficient numbers of animals used to assess each character. In this experiment pre and post partum variables measured did not show significant differences. For this reason we are only able to indicate possible tendencies rather than inferences derived from the statistical analysis. Although it is not reported in this work, the liveweights and liveweight gains from conception to 45 days before calving, were also not statistically different. However, as it can be seen in Table 2, the pre partum supplementation tended to improve the physical condition of the animal at calving. (535.2 vs 492.3 kg) and its liveweight immediately after calving (468.7 vs 417.0 kg), without any change in the length of gestation (275.1 vs 272.2 days) and in the incidence of retained placenta (17.6 vs 17.9%).

Table 2:

The effect of pre partum supplementation on liveweight pre and post partum and some reproductive indices.

Experimental group	Liveweight (kg)		Length of gestation(d)	Retention of placenta (%)
	Pre partum	Post partum		
Prepartum supplementation	535.2 ± 33.6	468.7 ± 33.2	275.1 ± 6.1	17.6
Without prepartum supplementation	492.3 ± 57.4	417.0 ± 39.8	272.2 ± 13.3	17.9

There was a residual effect of the pre partum supplementation (Table 3), it having a positive effect on post partum reproduction. For the group that received pre partum supplementation the first oestrus was recorded at an average of 70.2 days after calving, while the control group showed oestrus an average of 96.6 days after calving. However, the liveweight change between calving and first oestrus was in favour of the control group (+22.2 vs -22.2 kg). This drop in liveweight seen in the supplemented group could be due to the change in the feeding regime immediately after calving. However, at conception the supplemented group had stabilised their liveweight to an average of 439.2 kg at 111.1 days, while the control group suffered a reduction in liveweight to an average of 414.3 kg at 129 days.

Table 3:

The residual effect of pre partum supplementation on post partum reproductive performance

Experimental group	Interval between birth and				No. of services per conception
	First service Age	Weight(kg)	Conception Age	Weight(kg)	
Pre partum supplementation	70.2 ± 33.2	446.5 ± 43.8	111.1 ± 30.0	439.2 ± 27.0	2.11 ± 0.92
Without pre partum supplementation	96.6 ± 40.5	439.2 ± 27.7	129.9 ± 62.3	414.3 ± 30.8	1.95 ± 1.36

Again the non supplemented group required a fewer number of services per conception (1.95 vs 2.11.). Table 4 shows the data for milk production and length of lactation, no significant differences were shown, the supplemented group and non supplemented group before calving gave 3568.7 and 4363.7 kg in 307.0 and 342.8 days, respectively.

Table 4:
Milk production and length of lactation

Experimental group	Milk production (kg)	Length of lactation (d)
Pre partum supplementation	3568.7 ± 667.0	307.0 ± 36.8
Without prepartum supplementation	4363.7 ± 987.3	342.8 ± 65.2

Discussion

Results obtained in this preliminary study of the pre partum supplementation of Holstein heifers, indicate that there is a direct response in terms of pre partum liveweight gain as Broster (1971) suggested, but also that these heifers are able to mobilise, after calving, the reserves built up during the pre partum supplementation. According to Brody (1945) the physiological ability of heifers to gain or maintain weight, could also affect the milk production in the supplemented group. In the same way, the milk production potential and the ability to mobilise energetic reserves and compensate for nutritional deficits of the supplemented treatment, could explain the response during the whole lactation (Phipps 1973).

The results relating to reproductive performance in this study are in agreement with that reported by Lamming (1966) and King (1968). Haresign (1979), considered that the level of post partum nutrition had little effect on reproductive activity if the cow had calved down in good physical condition, and that the interval between calving and first oestrus was longer than 90 days when the levels of feeding before calving were restricted. This author also pointed out that when the liveweight loss from the beginning of the lactation was less than, or equal to 35 kg, the interval between calving and first service was 72 days, and 104 days when the loss in liveweight was greater.

Conclusions

According to the information reported in this study, nutritional supplementation of heifers 45 days before calving, improved subsequent reproductive performance, reducing by 26 days the interval between calving and first oestrus and reducing by 18 days the interval between calving and conception. It is likely that this improvement in reproductivity is not due solely to absolute differences in liveweight but due to differences in physical condition.

It is necessary to repeat this experiment supplementing before and after calving with the objective of comparing these treatments in terms of reproductive and productive performance of first calving heifers. At the same time, in order to complement this information an endocrine analysis should be done so that the physical responses can be related to the function of the gonads.

Although in terms of milk production the information reported in this work does not seem to show any residual effect of the pre partum supplementation, it would be advisable to continue this type of study with the aim of designing a nutritional strategy that would permit an increment in the levels of milk production during the first lactation.

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