Original Research

Effect of Hormonal Treatment on Induction of Milk in Crossbred Cattle

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Abstract

The present experiment was conducted to test the effect of hormonal treatment on the induction of milk in non-pregnant cross bred cows, heifers and repeat breeders which were not conceiving and to prevent the crossbred female animals from becoming the stray by putting them into lactation. The experiment was carried out on 9 animals kept at farmers' dairy farms and 3 animals in the KVK's dairy demonstration unit. It was noticed that all the treated animals started lactating on 14th to 15th day of the therapy but the secretions were watery. Later on 18th to 20th day, milk synthesis was started and about 500 ml. of milk was obtained. There was a gradual increase in the milk yield up to 25d after starting the treatment. The highest average milk yield obtained was 5.6kg/d amongst 4 heifers and the lowest value was 4.3 kg/d whereas the peak yield was found to be 11.5 kg/d and lowest peak was 6.5kg/d. Similarly, there was a variation in the number of days a heifer remained in lactation and the values varied between 370 to 420d. It was observed that there was a significant difference in the response of hormonal treatment on the type of animals. All aged animals did not respond well and there was a low average milk yield of 1.3 kg/d and the maximum was 2.5 kg/d whereas the value for peak yield was 4.0kg/d. Although, animals under both repeat breeder and aged group responded equally and there was no significant difference in both the groups regarding average milk yield, peak yield or duration of lactation. Hence, it can be said that this technique can help in reducing the population of stray animals but the use of this technique should be considered as last option for initiating lactation in problematic crossbred cattle only.

Key words: Anoestrus, Crossbred Cattle, Heifers, Hormonal Treatment, Induction of Milk

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Introduction

In Punjab, the problem of stray animals is increasing day by day. The dairy farmers are not showing interest to keep the cows but are keen to keep the buffaloes. Farmers feel that the crossbred cows become repeat breeders and stop milk production after 2nd or 3rd lactation. As cow slaughtering and its use for meat purpose is not an option in India, the non-lactating repeat breeder cows are finally left stray on the roads.

These stray animals again pose much risk to the people by causing accidents, spreading diseases and devastate the standing crops of farmers etc.

It has been well established through *in vivo* and *in vitro* studies that hormones play a crucial role in the development and function of the mammary gland (Tucker, 2000). Further, it has been shown that in dairy cows, estrogen stimulates mammary duct growth, and estrogen and progesterone in combination stimulate lobule-alveolar development of the mammary gland. The ovarian hormones, estrogen and progesterone, are not the only hormones required for lactogenesis, as prolactin is also needed. Blood prolactin levels in cattle surge several hours prior to parturition and this surge in prolactin is apparently necessary for full lactogenesis. Many techniques over the past 60 years have utilized the ovarian hormones estrogen and progesterone, alone or in combination, to develop the mammary gland and initiate lactation. In addition to this, various treatment protocols including hormonal as well as antimicrobial therapy have continuously being utilized by various veterinarians to treat reproductive disorders in bovines with varying degree of success (Lakhani *et al.*, 2017). Smith and Schanbacher (1973) developed a 7-d estrogen-progesterone protocol and successfully induced lactation in 60% of treated animals. Although this protocol was successful in 60% of treated animals but there was still substantial variability in milk yields between lactation-induced cows. Since the development of this shorter protocol, many modifications have been employed to improve success rates and reduce the variability in milk yields. The addition of reserpine, a tranquilizer that increases blood prolactin levels for several hours, and dexamethasone, a synthetic glucocorticoid, to induction protocols have increased success rates, but have not reduced the variation in milk yields recorded from induced cows (Peel *et al.*,1978).

In a study, Sharma *et al.* (2013) reported that the major problems being faced by the dairy owners were, low milk production, repeat breeding, low conception rate and high cost of feed ingredients as well as shortage of green fodder during the lean periods especially May-June and October-November. Therefore, use of artificial induction of lactation technique can reduce culling, economy losses and replacement costs derived from reproductive failure (Inchaisri *et al.*, 2010). Moreover, the average milk yield per lactation in hormonally induced cows was about 90% of cows whose lactation derives from calving and this level of milk yield is high enough for keeping overall herd efficiency (Mellado *et al.*, 2011). Similarly, Bangthai *et al.* (2015) reported that induced lactation by using diethylstilbestrol, hydroxy progesterone caproate and dexamethasone was a suitable proposition for use in unproductive and infertile cattle.

Hence, the present experiment was planned to test the effect of hormonal treatment on the induction of milk in non-pregnant cross bred cows, heifers and repeat breeders which were not conceiving and to prevent the crossbred female animals from becoming the stray by putting them into lactation.

Materials and Methods

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Selection of Animals

The experiment was carried out on 9 animals kept at farmers' dairy farms and 3 animals in the KVK's dairy demonstration unit. These 12 animals include 4 of each type:

Heifer (Age of animal in this group varied between 2.5 -4 yr): The crossbred heifers (50 % Holstein Friesian) which were non-lactating and non-pregnant, never conceived earlier were chosen for carrying out hormonal therapy.

Repeat Breeder (Age of animal in this group varied between 8-10 yr): Animals did not conceive even after inseminating many times. Hence, there was no alternative with the farmer to make this animal productive. At last, it was decided to induce milk let down through hormonal therapy.

Aged Animal (Age of animal in this group varied between 12-14 yr): These animals became anoestrus. The other problems noticed were of milk fever, lameness due to old age, mastitis and presence of follicular cyst. Hence, it was decided to take this animal for the artificial induction of milk under to assess the effect of age on the treatment response.

Table 1: Detail of animals selected for hormonal treatment

S. No.	Name and Address of the Farmer	Age of the Animal (Yr)
Heifer		
1-2	Mohinder Singh s/o Kewal Singh, Sultanpur	2.5 and 3
3	Kuldeep Singh s/o Tarsem Singh, Sultanpur	3.5
4	KVK Farm Kapurthala	4
Repeat Breeder		
5	Harvinder Singh S/o Tarsem Singh, Sultanpur	9
6	Amarjit Singh S/o Charan Singh, Kapurthala	9.5
7-8	Jasdeek Singh S/o Gurdeep Singh, Kapurthala	8 and 10
Aged Animals		
9	Balwinder Singh S/o Karamjit Singh, Sultanpur	12
10-11	KVK farm Kapurthala	13 and 13.5
12	Gurbachan Singh S/o Buta Singh, Sultanpur	14

Schedule of Injecting Hormones to the Experimental Animals

All the animals were examined before starting the treatment. After visual examination and ruling out any pregnancy, owner of the animal was asked to procure the required hormonal injections from the local market. The problematic animal was induced into lactation using a combination of estrogen and progestrone hormones followed by the injections of dexamethasone. All the animals were given injections with hormones and the detail is given as under:

Day 1 to day 10	Diethylstilbestrol (Stilvet @ 3 ml) + Hydroxy progesterone (proluton @ 1 ml) per day for first 10 days.
Day 11 to day13	Dexamethasone (demisone @ 6 ml) per day for 3d
Day 14	Rest day

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Day 15	Placentrex @ 6 ml/d
Day 16	Sequil @ 5 ml/day
Day 17	Placentrex @ 6 ml/d
Day 18	Sequil @ 5 ml/day
Day 19	Placentrex @ 6 ml/d
Day 20	Sequil @ 5 ml/d

On 15th day of treatment, the animals were approached for milking. The whole quantity of all the material secreted was discarded for first 25d after the day of last injection. The animals were watched carefully from the day the first injection was administered in the morning and evening daily. It is worth to mention that the animals who did not respond to the hormonal therapy should not be retreated with the above mentioned hormones. The data regarding milk production and general health conditions were recorded daily. The data was analysed statistically to compare the response between three types of animals treated with the hormonal therapy. The data was analyzed by using OPSTAT (Sheoran *et al.*, 1998).

Care and Management of the Treated Animals

All three animals were kept in the dairy demonstration unit of the KVK, Kapurthala. Seasonal green fodder plus wheat straw was offered *ad lib*. Drinking water was made available all the time in the shed. The amount of concentrate feed was provided on the basis of milk production @ 1 kg concentrate for every 2.5 kg of milk. There was no stress of any kind on the animals. Cleanliness was maintained to the maximum possible at the dairy farms. Feed and fodder was provided to the animal as per the requirements. Similarly, all the management practices were followed at the farmers' dairy farms as well by the farmers themselves because they were keen in finding out some solutions of the problem of repeat breeding and anoestrus.

Result and Discussion

It was noticed that all the treated animals started lactating on 14 to 15day of the therapy but the secretions were watery. Later on 18th to 20th day, milk synthesis was started and about 500 ml. of milk was obtained. There was a gradual increase in the milk yield up to 25d after starting the treatment. These results were in agreement with those reported by Hooda *et al.* (1997) who reported that milk secretion was started in 90 per cent of buffaloes between 14- 20 days after the start of the treatment. In the present study, the total milk obtained during the first 45d after starting the hormonal treatment was discarded as the wash out period for the induced hormones was observed to be 25d after the hormonal therapy. Thereafter, normal milk was obtained and there was no difference in the composition of milk obtained from cows treated with hormonal therapy and milk obtained from normal cows. These observations were in agreement with the findings of Bangthai *et al.* (2015) who also reported that milk was safe for consumption after one month of induction.

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Effect on Heifers

The data (Table 1) show that highest average milk yield obtained was 5.6kg/d amongst 4 heifers and the lowest value was 4.3 kg/d whereas the peak yield was found to be 11.5 kg/d and lowest peak was 6.5kg/d. Similarly, there was a variation in the number of days a heifer remained in lactation and the values varied between 370 to 420 days. This varied response may be due to the difference in the age of the animals as well as body condition score.

Table 1: History and lactation performance of hormonal treated crossbred cows

S. No.	Age of the Animal (Yr)	Average Milk Yield (kg/d)	Peak Yield (kg/d)	Duration of Lactation (days)
Heifer (Anoestrus)				
1	2.5	5.6	11.5	420
2	3	5	11	425
3	3.5	4.3	6.5	370
4	4	4.4	9.5	395
Repeat Breeder				
5	8	3.2	7	172
6	9	2	5.5	150
7	9.5	2.5	3.5	160
8	10	3.5	6.5	165
Aged Animals				
9	12	2	3.5	170
10	13	2.5	4	145
11	13.5	2	3.5	95
12	14	1.3	2.5	80

It was observed that those animals which were strong and sturdy yielded more quantity of milk for a longer duration than those who were weak. The average quantity of milk obtained in this group was 4.8 kg/d/animal for a period of 402 days and the average peak yield obtained was found to be 9.6 kg/d/animal. These values were significantly different than those obtained in repeat breeder and aged animals (Table 2). Further, out of four heifers treated with hormones, two animals become pregnant and delivered a healthy calf, yielded normal milk for complete lactation period whereas neither repeat breeder nor aged animals were conceived after following hormonal treatment.

Table 2: Average performance of hormonal treated crossbred cows

Type of Animal	Average Milk Yield (kg/d)	Peak Yield (kg/d)	Duration of Lactation (days)
Heifer (Anoestrus)	4.8	9.6	402.5
Repeat Breeder	2.8	5.6	161.7
Aged animals	1.9	3.4	122.5
CD (P=0.05)	**1.1**	**2.2**	**41.1**

Effect on Repeat Breeders

In this group of animals, the highest average milk yield per day obtained was 3.5 kg and the lowest was 2.0 kg whereas peak yield was found to be 7.0 kg/d. Similarly, the number of days, repeat breeders remained

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in lactation varied between 150 to 172 days. In comparison to anoestrus heifers, the performance of repeat breeder animals was just at 50 per cent. This may be due to the reason that these animals might have exhausted that's why these were not conceiving with artificial or natural insemination. This fact may be verified from the data about the age of animals which varied between 8 to 10 yr in this group. Significantly lower peak milk yield (5.6kg/d) and average milk yield/d/animal (2.8kg) was obtained in comparison to anoestrus heifers (9.6kg/d) and (4.8kg/d/ animal), respectively (Table 2).

Effect on Aged Animals

It was observed that there was a significant difference in the response of hormonal treatment on the type of animals. All the aged animals did not respond well and there was a low average milk yield of 1.3 kg/d and the maximum was 2.5 kg/d whereas the value for peak yield was 4.0kg/d. Likewise, animals in this group remained in lactation between 80 to 170 days whereas normal milk lactation cycle is of 305 days. Hence, animals under both repeat breeder and aged group responded equally and there was no significant difference in both the groups regarding average milk yield, peak yield or duration of lactation (Table 2).

The data (Table 1 & 2) showed that the animals belonging to the dairy farmers responded well and the peak milk yield obtained was 11.5kg/d. Moreover, all the animals remained in lactation for more than 305d. This was mainly due to the young age group of the problematic animals besides good management practices followed by the dairy farmers. These findings were in agreement with those reported by Chakriyarat *et al.* (1978) who used 19 dairy cows of varied breed and age, examined the effect of addition of 3 single injections of dexamethasone (0.028 mg/kg BW/d) on 18, 19 and 20 d of the 7-d estrogen-progesterone induction protocol. These researchers reported that addition of dexamethasone injections increased the number of cows (9 of 11; 82%) successfully induced into lactation compared with cows induced into lactation without dexamethasone (3 of 11; 27%). It has also been reported that the milk yields from these induced-lactations can be enhanced with the addition of prolactin, offering additional evidence that the hormones (estrogen, progesterone, prolactin, and glucocorticoids) work synergistically in the onset of lactogenesis (Tucker, 2000; Akers, 2002).

In the present study, response to hormonal treatment was different in different categories of animals (heifers, repeat breeders and aged cows). This variation in milk yield of individual animals may be due to the degree of ovarian activity, response level of steroid receptor, the rate of absorption from the injection site and metabolism of hormones, differences in the functional activity of other endocrine glands related to milk production as reported by Hooda *et al.* (1997).

Conclusion

Reproduction is an important consideration in the economics of cattle production. In the absence of regular breeding and calving at the appropriate time, cattle rearing will not be profitable. Artificial induction of

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milk in crossbred cattle is a simple method which showed a high success rate in anoestrus heifers as compared to repeat breeders and aged cows. Thus, it can help in reducing the population of stray animals but the use of this technique should be considered as last option for initiating lactation in crossbred cattle.

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References

1. Akers, R. M. (2002). *Lactation and the mammary Gland.* Iowa State Press, Iowa.
2. Bangthai, A., Sood, P., Singh, M., Kumar, R., Dogra, P. K., Nanda, T., Sharma, R., Vishwaradhya, T. M. and Kumar, P. (2015). Response and quantification of certain milk attributes following artificial induction of lactation in Jersey crossbred cows of Himachal Pradesh. Himachal journal of Agricultural Research, 41 (1), 55-60.
3. Chakriyarat, S., Head, H. H., Thatcher, W. W., Neal, F. C. and Wilcox, C. J. (1978). Induction of lactation: Lactational, Physiological, and Hormonal Responses in the bovine. Journal of Dairy Science, 61, 1715.
4. Hooda, O. K., Kaker, M. L., Dhanda, O. P., Galhotra, M. M.and Razdan, M. N. (1997). Induction of lactation and reproductive response in non-producing buffalo heifers following steroid hormone treatment. Asian-Australasian Journal of Animal Sciences, 10(5), 519-522.
5. Inchaisri, C., Jorritsma, R., Vos, P.L.A.M, van der Weijden, G.C., Hogeveen, H. (2010). Economic consequences of reproductive performance in dairy cattle. Theriogenology, 74, 835-846.
6. Lakhani,P., Thakur, A., Kumar, S. and Singh, P. (2017). Artificial induction of lactation in bovines: scope and limitations. International Journal of Livestock Research, 7 (4), 102-112. http://dx.doi.org/10.5455/ijlr.20170324031735.
7. Mellado, M., Antonio-Chirino, E., Meza-Herrera, C., Veliz, F. G., Arevalo, J. R., Mellado, J. (2011). Effect of lactation number, year, and season of initiation of lactation on milk yield of cows hormonally induced into lactation and treated with recombinant bovine somatotropin. Journal of Dairy Science, 94, 4524-4530.
8. Peel, C. J., Taylor, J. W., Robinson, I. B., McGowan, A. A., Hooley, R. D. and Findlay, J. K.(1978). The importance of prolactin and the milking stimulus in the artificial induction of lactation in cows. Australian Journal of Biological Science, 31,187.
9. Sharma, M., Singh, G. and Shelly, M. (2013). Technological Problems and Training Needs of Dairy Farmers. Journal of Krishi Vigyan, 2(1), 59-63.
10. Sheoran, O. P., Tonk, D. S., Kaushik, L. S., Hasija, R. C. and Pannu, R. S. (1998). *Statistical Software Package for Agricultural Research Workers*. Recent Advances in information theory, Statistics & Computer Applications by D.S. Hooda & R.C. Hasija Department of Mathematics Statistics, CCSHAU, Hisar: 139-143.
11. Smith, K.L. and Schanbacher, F. L. (1973). Hormone induced lactation in the bovine I. Lactational performance following injections of 17β-estradiol and progesterone. Journal of Dairy Science, 56, 738-743.
12. Tucker, H. A. (2000). Hormones, mammary growth, and lactation: a 41-year perspective. Journal of Dairy Science, 83,874.

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