Studies on biochemical changes in the uterine fluid of repeat breeding crossbred cows

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ABSTRACT

Biochemical changes in the uterine fluid of 10 normal and 45 repeat breeding cows were determined. Studies in the uterine fluid indicated significantly higher levels of total protein and inorganic phosphorus in normal cows compared to repeat breeding cows. The pH value of uterine fluid was significantly higher in repeat breeders normal cows. The levels of calcium, magnesium, copper and zinc were similar in both the groups.

The uterine environment influences the implanting of conceptus and the developing foetus during the entire gestation through providing shelter and nourishment. Embryo transfer, experiments in the cow have demonstrated the critical importance of the state of uterine environment for the viability and development of the embryo (Sreenan and Beehan, 1974).

The biochemical changes in uterine fluid of repeat breeders have not been studied adequately (Ayalon, 1984), which require, exploration in view of its intricate involvement in fertilization and embryo development.

MATERIALS AND METHODS

The present study was conducted on 10 normal and 45 repeat breeding crossbred cows belonging to the Livestock Farm and Veterinary Clinics, Punjab Agriculture University, Ludhiana. The cows under investigation were selected on the basis of their breeding history and were allocated into two groups.

In group I, normal cows having regular estrous cycle that conceived following inseminations within three successive cycles. In group II, repeat breeding cows had regular estrous cycles with apparently normal genitalia but failed to conceive after five successive inseminations with fertile semen.

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Uterine fluid was collected from 10 normal and 45 repeat breeding cows on the day of estrus following the technique of Fanning *et al.* (1966) with slight modification. The fluid was aspired forcefully and collected into the graduated glass tube. All uterine fluid samples were stored at -20°C until analysis. The samples of uterine fluid were centrifuged at 3000 rpm for 15 minutes immediately after thawing to separate the cellular elements present in the uterine fluid. Owing to the small volumes of uterine fluid obtained from each cow, it was necessary to pool the samples in several lots, to obtain a sufficient quantity for biochemical estimation.

Biochemical Assay

pH - Since quantity of uterine fluid was inadequate, approximate estimation of pH of uterine fluid was made using BDH indicator paper.

Total protein - The total protein was estimated following the method described by Wootton (1964).

Inorganic phosphorus - The method described by Tausky and Shorr (1954) was followed for the estimation of inorganic phosphorus in the sample.

Calcium, Magnesium, Copper and Zinc was estimated by atomic absorption spectroscopy by the method of Ludmilla (1976). The statistical variations of the data were tested by Student's "t" test as described by

Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

The changes in the concentration of different biochemical constituents of uterine fluid of normal and repeat breeding cows are presented in table.

The mean volume of uterine fluid recovered on the day of oestrus in normal and repeat breeder cows was 0.67 ± 0.04 and 0.73 ml, respectively and the difference was found to be non-significant. The present finding was consistent with the findings of Olds and Van Demark (1957).

The pH value of the uterine fluid on the day of oestrus in normal and repeat breeding cows was found to be 6.90 + 0.09 and 7.82 ± 0.08, respectively. The pH value of uterine fluid in repeat breeding cows was significantly higher ($P < 0.01$) as compared to the normal cows. Similar findings were reported by Boiter *et al.* (1980). The higher pH value of the uterine fluid in repeat breeding cows might be due to presence of pathogenic organisms causing inflammation and denudation of uterine mucosa leading to marked changes in reaction of its secretion (Lamothe and Guay, 1970).

The mean level of total protein in the uterine fluid of normal and repeat breeding cows during oestrus was found to be 8.12 ± 0.23 and 6.23 ± 0.14 g%, respectively. The statistically difference in the total protein was highly significant ($P < 0.01$). Similar findings were also reported by Ayalon (1978). Total protein differences in the uterine fluid of normal and repeat breeding cows may be related to the differences in the

quantity of cytosol and nuclear progesterone receptors in the endometrial cells (Ayalon, 1984).

The mean value of inorganic phosphorus in the uterine fluid during oestrus in normal and repeat breeding cows was found to be 11.07 ± 0.45 and 9.10 ± 0.23 mg/100 ml, respectively. The mean value being significantly ($P < 0.01$) higher in normal cows in comparison with that of repeat breeding cows. Schultz *et al.* (1971) also recorded similar value of inorganic phosphorus in the uterine fluid of cows during oestrus. Significantly lower values of phosphorus in the uterine fluid of repeat breeding was suggested involvement of phosphorus during fertilization or implantation. There was no significant alteration in the concentration of calcium, magnesium, copper and zinc between the uterine fluid of normal and repeat breeding cows.

Table 1 : Biochemical changes in the uterine fluid of normal and repeat breeding cows (mean ± S.E.)

Parameters	Normal	Repeat Breeding
Volume (ml)	0.67 + 0.04	0.73 ± 0.03
pH	6.90 ± 0.09	7.82 ±0.08**
Total protein (gm %)	8.12 ±0.23**	6.72 ±0.14
Calcium (mg %)	10.96 ±1.50	9.56 ±0.90
Inorganic Phosphorus (mg %)	11.07 ±0.45**	9.10 ±0.23
Magnesium (mg %)	8.92 ±0.49	9.18 ±0.59
Copper (mg %)	0.57 ±0.20	0.49 ±0.13
Zinc (mg %)	0.73 ±0.17	0.65 ±0.12

Mean with superscripts differ significantly between the group
**$P<0.01$

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Adoption pattern of artificial insemination (AI) in Punjab

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ABSTRACT

The study was conducted in six different agro-climatic regions of Punjab. The data was collected from 180 dairy farmers, 30 each from six agro-climatic regions with the help of structured interview schedule. Farmers expressed different views for adoption and non-adoption of AI in the field and few still believe in superstitions and various false notions regarding adoption of AI. Main reasons for adoption of AI were increased milk production (94.50%), higher conception rate (71.42%), easy access to AI (56.04%) etc. Main reasons for non-adoption of A.I. considered by farmers were poor conception rate with AI (84.26%), inferior semen quality (77.52%), birth of more male than female calves (33.70%), non availability of AI on holidays (32.58%).

Key words: Agro climatic regions, artificial insemination, dairy farmers, Punjab.

Artificial insemination (AI) is one of the most important biotechnological tool that has been developed to bring genetic improvement of animals. The principal advantage of AI over natural breeding is its economic viability and rapid propagation of superior germplasm. India is having 92.56% of indigenous cattle population while the annual growth of crossbreds is only 5.92% (Anonymous 1977). There can be a number of factors associated with such little increase in the crossbred animals; one could be the poor conception rate i.e. 5.40% after using AI. Another may be extent of adoption of A.I. technology by livestock owners, which at present seem to be good order, as the farmer's attitude towards AI is still not favourable. Farmers do not adopt AI due to many reasons. These can be distant location of AI centres, poor heat detection, cost factors, misconception, superstitions and doubts regarding AI (Dana 1987). So the present study was undertaken to know reasons for adoption and non-adoption of AI Punjab.

Punjab has been divided into six different regions on the basis of agro-climatic conditions (Kingra *et al.,* 2001). The study was conducted in these agro-climatic regions of state. From each of these agro-climatic regions one district was selected randomly and from already selected district of each region two villages were selected randomly which are:

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The data was collected from 180 dairy farmers, 30 farmers from each agro-climatic region. Overall 51% of the farmers adopted AI and 49% did not adopt (Table 1 and 2).

S No	Region	District	Village
I	Sub-mountain undulating region	Nawanshahar	Sarora,Mallewal Kandi
II	Undulating plain region	Gurdaspur	Ghot Pokerm Gazikot
III	Central plain region	Ludhiaana	Roomi Kalan, Agvaar Lopon
IV	Western plain region	Moga	Takhanwadh, Jhandiana Sarki
V	Western region	Bathinda	Jassi Baghwali, Jumba Bhaike
VI	Flood plain region	Ludhiana	Sidhawan Bet, Salempura

Reasons for adoption of AI in Punjab

This is clear from Table 1 that 94.50% of the respondents adopted A.I. because milk production increases in next progeny as well as genetic improvement of animal occurs in a short time. In Region 1 and III, 100 % of the respondents gave this as sole reason. The results of our study are similar to earlier report by Kulkarni (1973) who found that majority of the farmers had a favourable opinion about the effect of AI on milk yield in cattle. Further, Halyel *et al.* (1980) also reported that

Table 1. Distribution of dairy farmers according to the reasons for adoption of artificial insemination as revealed by respondents (Multiple response) in different agro-climatic regions of Punjab

S.No	Reasons for adoption of AI	Agro-climatic regions						Total
		I (n=16)	II (n=16)	III (n=14)	IV (n=14)	V (n=11)	VI (n=20)	N=91
1	AI is economical	9 -56.25	11 -68.75	-	5 -35.71	7 -63.63	3 -15	35 -38.46
2	Easy access to AI	9 -56.25	11 -68.75	3 -21.42	12 -85.71	9 -81.81	7 -35	51 -56.04
3	Less chances of disease transmission with AI	1 -6.25	1 -6.25	2 -14.29	5 -35.71	2 -18.18	4 -20	15 -16.48
4	More conception with AI	13 -81.25	1 -6.25	10 -71.42	13 -92.85	10 -90.9	18 -90	65 -71.42
5	Milk production increases with AI	16 -100	15 -93.75	14 -100	12 -85.71	10 -90.9	19 -95	86 -94.5
6	Convenient and time saving	-	-	2 -14.29	-	1 -9.09	1 -5	4 -4.4
7	Miscellaneous	9 -56.25	1 -6.25	4 -28.58	2 -14.29	1 -9.09	6 -30	23 -25.27

Figures in parentheses indicate percentage
n=No. of adoptors in each region; N=Total no. of adoptors

increase in productivity is one of reasons for adoption of artificial insemination. So, it is very clear from the present study and earlier reports that farmers adopt AI for genetic as well as milk yield improvement.

Table 1 clearly indicates that 71.42% of the respondents gave the reason for adoption of AI as the chances of conception with AI are more than natural service. There was variation in different regions as revealed by the farmers for adoption of AI. The results in Table I indicate that overall 56.04% of the farmers gave the reason as easy access to AI service for its adoption. The difference in the adoption of AI due to access to the farmers can be multi-factorial like location and timing of hospital, manpower and awareness.

Overall 38.46% of the farmers in different agro-climatic regions concluded that it is economical as compared to natural service as there is no need of rearing the bull. Region-wise data showed that 68.75% of the farmers in region II gave economic reason for adoption of AI. Interestingly, no farmer in Region III gave this reason for adoption of AI. The difference can be due to many factors like awareness, mass media exposure and extension contacts 16.48% of the farmers gave the reason as less chances of disease transmission with AI

for the adoption of AI (Table 1). Region IV had maximum number of farmers i.e. 35.71% quoting this for the adoption of AI. There were very few farmers quoting this reason for adoption of AI which can be mainly due to the lack of knowledge of the farmers. Overall 4.40% of the farmers quoted AI as convenient and time saving for the adoption of AI.

Miscellaneous reasons for adoption of AI

(a) Non-availability of better bull (b) Results of AI are good (c) Easy transportation of cows to AI centre (d) AI improves the breed (e) Availability of good inseminator.

A total of 25.27% (Table 1) of the farmers gave the above miscellaneous reasons for the adoption of AI.

It can be summarized that adoption of AI by dairy farmers in the different regions of Punjab is influenced by many factors varying from milk production, economical, disease control to miscellaneous reasons.

Reasons for non- adoption of AI in Punjab

Various reasons given by the dairy farmers for non-adoption of AI are listed in Table 2. Overall, 84.26

Table 2. Distribution of dairy farmers according to the reasons for non-adoption of artificial insemination as revealed by respondents (Multiple response) in different agro-climatic regions of Punjab

S.No	Reasons for adoption of AI	Agro-climatic regions						Total
		I (n=14)	II (n=14)	III (n=16)	IV (n=16)	V (n=19)	VI (n=10)	N=89
1	Conception rate is poor	12 -85.71	10 -71.42	14 -87.5	15 -93.75	16 -84.21	8 -80	75 -84.26
2	Against nature	-	-	-	-	-	1 -10	1 -1.12
3	High cost	-	2 -14.29	-	1 -6.25	1 -5.26	-	4 -4.45
4	Inseminator not available	-	7 -50	8 -50	-	-	-	15 -16.85
5	Inferior semen quality	12 -85.71	10 -71.42	12 -75	15 -93.75	14 -73.63	6 -60	69 -77.52
6	Distant location	3 -21.42	11 -78.57	2 -12.5	1 -6.25	-	-	17 -19.1
7	Breed character lost	-	1 -7.14	-	-	-	-	1 -1.12
8	Non-availability on holidays	-	7 -50	7 -43.75	6 -37.5	6 -31.58	3 -30	29 -32.58
9	Limited timings	-	4 -28.57	4 -25	5 -31.25	7 -36.84	3 -30	23 -25.84
10	A I produces more male calves	4 -28.57	6 -42.85	5 -31.25	7 -43.75	5 -26.31	3 -30	30 -33.7
11	Miscellaneous	9 -64.28	13 -92.85	11 -68.75	10 -62.5	12 -63.15	7 -70	62 -69.66

Figures in parentheses indicate percentage

n=No. of adoptors in each region. N=Total no. of adoptors

per cent of the farmers opined that conception rate was poor with AI. Region-wise, 93.75% of the farmers in Region IV gave this reason for non- adoption of AI. Our findings are in agreement with the earliest reports by Saini (1975) and Halyel *et al.* (1980) who had concluded that poor conception rate was one of factors for non-adoption of AI in the field.

Overall in six agro-climatic regions, 77.52% of the respondents told that semen was of inferior quality for non-adoption of AI. Region IV had maximum number of farmers (93.75%) quoting this reason for non- adoption of AI. Quality of semen has been quoted by good percentage of farmers as the sole reason for its non-adoption which is supported by conception rate of animals by AI in the field. Total 33.70% of the respondents in six-agro-climatic regions of Punjab gave the reason that AI produces more male calves than female calves for

non-adoption of AI (Table 2). There is no scientific logic for this belief among the farmers. Table 2 indicated that overall 32.58% of the farmers were of the opinion that AI service is not available on holidays. Region II had maximum number of farmers (50.00%) who gave this reason for non-adoption of AI. Non-availability of AI service on the holidays may be a strong reason for its non-adoption.

Overall 25.84% of the respondents cited the reason that for non-adoption of AI is the working hours of hospital are limited (Table 2). This can also be a cause as revealed by farmers for non-adoption of AI in the field as the hospitals/government institutions are working on the fixed time scale and round the clock services are deficient in the field. Total 19.10% of the farmers in six agro-climatic regions concluded that distant location of AI centre is the reason for non-adoption of

AI (Table 2). Our results are similar to earlier findings reported by Parshad *et al.* (1970) and Saini *et al.* (1977). They found that distant location of AI centre significantly affected the adoption of AI in cows. They supported that distance from artificial insemination centre was having a negative relationship with adoption of this biotechnological tool by the farmers. The region-wise variation in the farmers may be based on various existing conditions at their place.

Total 16.85% of the farmers stressed that competent inseminator is not available. The variations can be due to the lack of awareness, knowledge and mass media exposure. A total of 4.49 per cent of the farmers concluded that high cost is the reason for non-adoption of AI (Table 2). Only 1.12% of the respondents gave the reason for non- adoption of AI that it is against nature. The similar reasons have also been reported by Parshad *et al.* (1970) that this practice is against nature and social customs as major significant reasons, which affected the adoption of AI in cows. Very less number of the farmers (1.12%) told that indigenous breed characters are lost as the reason for non-adoption of AI.

Miscellaneous reasons for non- adoption of A.I.

Many miscellaneous reasons were given by the farmers for non- adoption of AI.

i) Availability of his own bull.

ii) AI lead to infection as inseminator inserts his hand into animal.

iii) It was time consuming as the person has to take animal to hospital.

iv) Better conception in natural breeding.

v) It produces calves without horns and animal becomes repeat breeder.

vi) Calf born with A I is weaker compared to natural service.

vii) Many farmers had adopted AI but owing to its poor result shifted to natural service again.

viii) After AI animal does not come in heat and off springs produce less milk.

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ix) As it is government work/run programme so faith is comparatively less.

x) Buffaloes are difficult to take to the AI centre/ hospitals.

xi) Non-availability of semen or liquid nitrogen.

xii) Buffaloes do not conceive with AI.

xiii) Sire should be shown to them whose semen is being used in AI.

Overall, 69.66% of the farmers gave the above reasons for non- adoption of AI (Table 2).

It can be summarized from the present findings that still dairy farmers do not adopt AI due to many unscientific reasons, beliefs, superstitions which depict their lack of awareness and knowledge regarding this biotechnological tool. This gap needs to bridged through better extension network and continuous education of farmers.

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