

Effect of Sheltering During Summer on Serum PBI Content of Kankrej and Kankrej x Jersey (F₁) Cattle

J. P. Patel, R. Borah, A. D. Dave and J. M. Patel

Department of Livestock Production, College of Veterinary Science and Animal Husbandry, Anand Campus, Anand

ABSTRACT

Experiment was conducted to study the effect of sheltering during summer on serum PBI content in order to assess the thyroid activity in Kankrej and Kankrej Jersey (F₁) cattle. Serum PBI content in sheltered group was higher by 14.56 and 11.24 per cent than that of the exposed group in Kankrej and Kankrej x Jersey (F₁) respectively. The difference in PBI content for two groups was highly significant ($P < 0.01$) in Kankrej and significant ($P < 0.05$) in Kankrej x Jersey (F₁). Week to week variation in PBI content was highly significant ($P < 0.01$) in both the breeds for sheltered as well as exposed group.

Findings revealed that under summer stress thyroid activity is significantly suppressed in indigenous as well as crossbred animals and sheltering definitely helps in maintaining higher thyroid activity.

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INTRODUCTION

Thyroid hormones play an intricate role in nutrient metabolism, promotion of growth and milk production (Turner, 1966). Serum protein bound iodine (PBI) content is an important indicator to assess the level of circulating thyroid hormones. Depression in thyroid activity during hot environment has been documented (Thomson *et al.* 1963; Kapoor and Mahadevan, 1971; Kapoor *et al.* 1974). Investigations discussing effect of sheltering (especially during summer stress) on thyroid activity in indigenous and crossbred cattle under tropical/sub-tropical climate could not be traced. Therefore, in the present paper an attempt has been made to furnish some information on this aspect in Kankrej and Kankrej x Jersey (F₁) crossbred cattle.

MATERIALS AND METHODS

An experiment was conducted at Veterinary Science College, Anand during intense summer (March, 28 to June, 28, 1978). Twelve Kankrej heifers (16-37 months) and 12 Kankrej x Jersey (F₁) crossbred male calves (10-15 months) were the experimental animals. Two groups, each of 6 animals were made on the basis of age and body weight of the animals for both respective breeds. One group from each breed was kept in an open yard, completely exposed to sun and the other was sheltered in a shed with a dom shape roof.

Blood samples of all the experimental animals were collected once in a week and separated serum was used for PBI estimation. Serum PBI was esti-

estimated as per the method of Acland (1957). Statistical analysis of the data was carried out after Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Protein Bound Iodine (PBI)

(a) *Kankrej heifers*: Average serum PBI content of Kankrej heifers of sheltered and exposed group for different weeks under study is presented in Table 1 alongwith ANOVA.

It can be seen from the presented data that the average PBI content in serum of sheltered and exposed heifers was 5.90 and 5.15 $\mu\text{g}/100\text{ ml}$ respectively. The sheltered group had 14.56 per cent higher PBI concentration than the exposed group. This difference of PBI content was highly significant ($P < 0.01$). It can further be noticed that the week to week variation in serum PBI concentration was also highly significant ($P < 0.01$) in both exposed as well as sheltered group.

TABLE 1

Average serum protein bound iodine content of Kankrej heifers. (μg per 100 ml).

Weeks	Shed group	Exposed group	Average
1	4.48	3.58	4.03
2	4.48	3.92	4.20
3	3.93	3.20	3.57
4	7.46	6.53	7.00
5	4.15	4.29	4.22
6	8.25	7.79	8.02
7	7.32	6.85	7.09
8	7.32	5.35	6.34
9	5.65	4.64	5.15
10	5.73	4.66	5.20
11	5.55	5.15	5.35
12	6.03	5.19	5.61
13	6.35	5.85	6.10
Average	5.90	5.15	5.53

ANOVA

Sources of variation	d.f.	S.S.	M.S.	Cal. F.	Table value of F	
					5%	1%
Weeks	12	43.27	3.61	29.87**	2.69	4.16
Treatment	1	3.62	3.62	29.98**	4.75	9.33
Error	12	1.45	0.12	—	—	—
Effect	S.Em. : C.D. at 5% : C.D. at 1% : C.V.%					
Weeks	0.25	0.76	1.08	6.30		
Treatment	0.10	0.31	0.43			

**Significant at $P < 0.01$.

It ranged from 3.93 to 8.25 $\mu\text{g}/100$ ml for the sheltered group and 3.20 to 7.79 $\mu\text{g}/100$ ml for the exposed group.

group for different weeks under study is presented in Table 2 along with ANOVA.

Data presented in Table 2 showed that the average serum PBI content of sheltered and exposed group was 5.54

(b) *Cross bred males*: The average serum PBI content of castrated crossbred males of exposed and sheltered

TABLE 2

Average serum protein bound iodine content of castrated crossbred males.

(μg per 100 ml).

Weeks	Shed group	Exposed group	Average
1	4.11	2.45	3.28
2	3.76	4.49	4.13
3	5.54	5.71	5.63
4	7.16	6.46	6.81
5	4.48	4.88	4.68
6	7.14	6.52	6.83
7	6.67	5.45	6.06
8	5.69	4.45	5.07
9	5.66	3.93	4.80
10	6.69	6.41	6.55
11	5.67	4.63	5.15
12	4.66	4.65	4.66
13	4.83	4.48	4.66
Average	5.54	4.96	5.25

ANOVA

Sources of variation	d.f.	S.S.	M.S.	Cal. F.	Table value of F	
					5%	1%
Weeks	12	27.69	2.31	7.62**	2.69	4.16
Treatment	1	2.19	2.19	7.24*	4.75	9.33
Error	12	3.63	0.30	—	—	—
Effect	S.E.m.	C.D. at 5%	C.D. at 1%	C.V. %		
Weeks	0.39	1.20	1.68	10.50		
Treatment	0.15	0.46	N.S.			

*Significant at $P < 0.05$

**Significant at $P < 0.01$

and 4.96 $\mu\text{g}/100$ ml respectively. The males housed in the shed had 11.24 per cent higher PBI content than those kept in the open. This difference in PBI content was statistically significant ($P < 0.05$).

Analysis of the data further revealed that the week to week variation in serum PBI concentration was highly significant ($P < 0.01$) for both the groups. PBI content varied from 3.76

to 7.76 $\mu\text{g}/100$ ml for the exposed group. The range of serum PBI concentration for sheltered group in the present study is higher than that reported by Singh *et al.* (1970) for Sahiwal x Holstein crosses.

Analysis of variance showing the influence of week, shelter, breed and various interactions on serum PBI concentration are shown in Table 3.

TABLE 3
Analysis of variance of experimental data.

Source	d.f.	S.S.	MSS	F	SEM	CD 0.05
Breed group (G)	1	0.98	0.98	4.62 ^{NS}	0.09	—
Weeks (W)	12	57.81	4.82	22.73**	0.23	0.71
Shelter (S)	1	5.72	5.72	26.98**	0.09	0.28
W x G	12	13.145	1.095	5.16**	0.33	1.07
W x S	12	2.54	0.29	1.37 ^{NS}	—	—
S x G	1	0.90	0.090	0.42 ^{NS}	—	—
W x S x G	12	2.5445	0.212	—	—	—

**Significant at 1% level.

It is evident from the results that week and shelter both had significant influence ($P < 0.01$) on serum PBI content. Influence of breed was observed to be non-significant. Among interactions, week x breed interaction was found to exert a significant influence. It is difficult to give the precise explanation for the same. However, significantly lower values of serum PBI of exposed group in comparison to sheltered one clearly suggest that under summer stress thyroid activity of the

animals is suppressed considerably and sheltering is definitely beneficial for maintaining high thyroid activity (serum PBI level) both in indigenous as well as crossbred cattle.

(c) *Climatic elements and Serum PBI Concentration*: In order to find out all possible relationships between various climatic elements and PBI content of serum, correlation coefficients were worked out. The results are presented in Table 4.

TABLE 4
Correlation coefficient between serum protein bound iodine and climatic elements.

Climatic elements	Crossbred males		Kankrej heifers	
	Shed group	Exposed group	Shed group	Exposed group
Average ambient temperature	0.41	0.27	0.19	0.22
Maximum temperature	0.31	0.21	0.06	0.05
Minimum temperature	0.30	0.19	0.37	0.33
Mean temperature	0.50	0.33	0.36	0.32
Diurnal difference	-0.02	0.00	-0.21	-0.19
Average vapour pressure	0.37	0.34	0.43	0.38
Average relative humidity	0.06	0.15	0.20	0.16
Duration of sunshine	0.12	0.09	0.05	0.14

Results showed that the average ambient temperature, maximum temperature, minimum temperature, average vapour pressure and average relative humidity had non-significant but positive association with serum PBI concentration in both the breeds, for those housed in shed as well as kept in open. The diurnal difference had negative association with serum PBI in both the breeds for both the groups.

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