

飼養管理状態の異なる牛群間の副腎皮質機能検査所見と 罹病率

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Relationship between Adrenocortical Function Test and Morbidity in Three Herds of Cow

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Poor feeding and breeding environment were thought to lead to reproductive disease in the cow [3, 4, 7, 13]. Adrenocortical function test of cows with reproductive disease suggested that there were abnormal function of the adrenal cortex [9]. It has been assumed that these two stress factors influencing the adrenocortical function result in the reproductive disease. However, there is no clear evidence to relate reproductive disease with these factors, because blood samples of these cows were collected from many farms with different breeding environment. Therefore, it seems possible to assume that the adrenocortical function of cows bred on the same conditions is similar regardless of the reproductive disease or health.

The purpose of the present paper is to compare the adrenocortical function and morbidity in herds raised under different breeding environment.

One hundred eighteen Holstein-Friesian cows from 3 different farms were designated as Groups A, B and C. The cows in Group A had a good breeding environment and herd morbidity was low, while Groups B and C had a poor breeding environment with high herd morbidity. Cow numbers and milk yield were similar in these 3 groups. Examinations were performed four or five times a year. Cow numbers and mean ages are shown in Table 1. Use of the milk samples instead of the blood samples is dependent upon each investigation [2, 5, 9, 10, 12, 14, 15]. After the morning milking (8-9 AM), the remaining milk in the mammary gland was collected and immediately 1 mg of ACTH-Z (Daiichi Seiyaku Co. Ltd. Tokyo) per head was administered intramuscularly. Twelve hours after ACTH-Z injection, milk was again obtained by the same method as that of the first collection, and frozen at -20°C until the radioimmunoassay analysis of cortisol [8].

Responsive ratio of milk cortisol (RRMC) to

ACTH-Z injection was calculated using the following formula: milk cortisol value 12 hr after ACTH injection/milk cortisol value before ACTH injection [14]. Cows with reproductive and other diseases before and after one month of each experiment were investigated from the charts at the Animal Hospital of the Agricultural Mutual Aid Association. RRMC to ACTH-Z injection in Groups A, B and C are shown in Table 2. There was no correlation between RRMC and days after parturition in all groups. The coefficient of correlations for Groups A, B and C were 0.128, -0.022 and -0.012, respectively. There was no difference in the mean RRMC in season and aging among the 3 groups.

The adrenal function test in cows has been used as an index of stress [1, 6, 11, 16, 17]. Adrenal cortex dysfunction in cows with follicular cyst was reported [9]. Relationship between the response of the adrenal cortex to ACTH injection and the degree of the disease or the rate of cure was indicated [9]. Different responses of the adrenal cortex in each follicular cystic cows were observed because these blood samples were collected from the cows of various groups.

From the results of this study, the relationship between the function of the adrenal cortex and the degree of the disease or the rate of cure could not be established.

The morbidity in the three groups of cows each year for 4 consecutive years of the experiment was studied. The morbidity rates of Group A were 38-39-49-39%, Group B, 92-81-76-67%, and Group C, 54-72-93-40%. Low morbidity was observed through 4 years in Group A but was high in both Groups B and C. The morbidity rates one month before and after adrenal function test in Groups A, B and C were 16%, 57% and 67%, respectively. The milk yield per head in a year for 4 consecutive years in Groups A, B and C were 7700-7700-8600-8800 kg, 7900-8500-8200-8100 kg and 7200-7300-7300-7300 kg, respectively. An increment of the milk yield in Group A was significant but a change was not observed in the other two groups.

Table 1. Experimental cows

Groups	Total No. of cows	Average age	No. of cows				
			December	April	May	August	October
A	37	4.1±0.5 ^{a)}	6	11	4	8	8
B	42	5.0±0.7	7	0	9	15	11
C	39	5.8±0.8	6	4	7	17	5

a) Mean±S.D.

Table 2. Responsive ratio of milk cortisol (RRMC) to ACTH-Z injection in the three groups of cow (mean±S.D.)

Groups	Total No. of cows	RRMC	Nondisease		Reproductive diseases ^{a)}		Other diseases ^{b)}	
			No. of cows	RRMC	No. of cows	RRMC	No. of cows	RRMC
A	37	4.3±0.8 ^{c)}	31(84)	4.5±1.1 ^{c)}	4(11)	5.6±2.4 ^{c)}	2(5)	3.9 ±1.8 ^{c)}
B	42	2.7±0.6 ^{d)}	18(43)	2.9±1.2 ^{d)}	17(40)	2.4±1.0 ^{d)}	7(17)	3.1 ±0.6 ^{c)}
C	39	1.6±1.2 ^{d)}	13(33)	2.4±0.9 ^{d)}	17(44)	0.3±2.4	9(23)	0.03±1.3 ^{d)}

a) Ovulation failure, follicular cyst, persistent corpus luteum, dystocia, retained placenta, uterine prolapse, endometritis, parturient paresis.

b) Mastitis, ketosis, Japanese theileriasis, heatstroke.

c, d) Means with the same subscript in the same column were not significantly different at 5% probability level.

From these findings the cause of the decline of the adrenocortical function in the cows of Groups B and C was speculated to be due to the poor environment and management and unbalanced feeding. If the cause of the high morbidity in Group C was due to the limits of the ability of milk production, it suggests that milk yield in Group C could increase gradually for 3 consecutive years of the experiment and decrease suddenly thereafter. But these changes in the milk yield were not observed in Group C. In addition, the family line of the cows in Group B and C was better than the cows in Group A.

The mean age were 4.1 in Group A, 5.0 in Group B and 5.8 in Group C. Otherwise the dimension of the RRMC was Group A>Group B>Group C. Between the mean age and the RRMC no correlation was observed.

REFERENCES

1. Alam, M. G. S., Dobson, H. and Fitzpatrick, R. J. 1986. *Br. Vet. J.* 142: 239-245.
2. Butler, W. R. and Des Bordes, C. K. 1980. *J. Dairy Sci.* 63: 474-477.
3. Friend, T. H., Polan, C. E., Gwazdauskas, F. C. and Heald, C. W. 1977. *J. Dairy Sci.* 60: 1958-1963.
4. Friend, T. H., Gwazdauskas, F. C. and Polan, C. E. 1979. *J. Dairy Sci.* 62: 768-771.
5. Gwazdauskas, F. C., Paape, M. J. and McGilliard, M. L. 1977. *Proc. Soc. Exp. Biol. Med.* 154: 543-545.
6. Gwazdauskas, F. C., Paape, M. J., Peery, D. A. and McGilliard, M. L. 1980. *Am. J. Vet. Res.* 41: 1052-1056.
7. Gwazdauskas, F. C., Keys, Jr. J. E. and McGilliard, M. L. 1986. *J. Dairy Sci.* 69: 2134-2139.
8. Makino, T. and Kanbegawa, A. 1973. *Folia Endocrinol. Jpn.* 49:1297-1306 (in Japanese).
9. Miyazawa, K., Ono, H., Miyake, M. and Sato, K. 1975. *Jpn. J. Anim. Reprod.* 20: 138-143 (in Japanese).

10. Miyazawa, K. 1984. *Res. Bull. Obihiro Univ.* 13: 229-235.
11. Paape, M. J., Desjardins, C., Guidry, A. J., Miller, R. H. and Smith, V. R. 1977. *Am. J. Vet. Res.* 38: 1345-1348.
12. Robert, D. B. and Gangwar, M. I. 1978. *J. Dairy Sci.* 61: 1103-1108.
13. Smith, R. D., Hansel, W. and Coppock, C. E. 1975. *J. Dairy Sci.* 58: 1708-1712.
14. Soma, K., Miyazawa, K., Miyake, M. and Maruo, Y. 1984. *Res. Bull. Obihiro Univ.* 13: 237-241 (in Japanese).
15. Termeulen, S. B., Butler, W. R. and Natzke, R. P. 1981. *J. Dairy Sci.* 64: 2197-2200.
16. Venkateseshu, G. K. and Estergreen, Jr. V. L. 1970. *J. Dairy Sci.* 53: 480-483.
17. Wegner, T. N. and Scott, G. H. 1972. *J. Dairy Sci.* 55: 1464-1469.

要 約

飼養管理状態の異なる牛群間の副腎皮質機能検査所見と罹病率（短報）：宮澤清志・明石延幸・奥田 潔・丸尾芳彦¹⁾・池広靖和¹⁾（帯広畜産大学家畜臨床繁殖学教室，¹⁾広尾町農業共済組合家畜診療所）——飼育頭数および年間搾乳量がほぼ等しい牧場の中から，飼養管理がよく疾病発生率の低い牧場（A群），飼養管理に問題があると考えられ，疾病発生率の高い牧場（B群，C群）について副腎皮質機能を比較した。罹病率はA群16%，B群57%ならびにC群67%であった。ACTH-Z 負荷後の乳汁中コーチゾール値の上昇倍率は，A群では 4.3 ± 0.8 倍，B群では 2.7 ± 0.6 倍，C群では 1.6 ± 1.2 倍で，A群と他の2群との間に有意差（ $P < 0.05$ ）がみられ牛群の罹病率と副腎皮質機能とは密接な関係にあることが示唆された。