

## **The Influence of Feeding Concentrates in a Lump Weekly on the Total Ration Intake of Beef Cattle during Middle and Late Fattening Period**

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(Received September, 20, 1997)

### **Introduction**

Daily manual feeding is laborious routine for beef producers because of a large amount of concentrates to be fed to fattening beef cattle. Recently, a variety of automatic feeding systems have been developed in search of more labor-saving management practices. However, since most of the systems require a vast capital investment, they are not extensively used by even large-scale farms in Japan. Therefore, it is necessary for beef producers to develop other feeding programs than automated or mechanized method. It is unknown whether feeding concentrates for 7 days in a lump affects total intake of ration and eating behavior of fattening beef cattle.

From the standpoint of the establishment of labor-saving feeding systems for beef cattle during middle and late fattening period, this study was carried out to clarify the difference in total intake of ration and eating time between feeding concentrates twice a day (daily feeding) and lump feeding once a week (weekly lump feeding) systems.

### **Material and Methods**

#### **1. Experiment 1**

Comparisons of feed intake and eating behavior between feeding concentrates twice a day (DF) and weekly lump feeding (WLF) during middle and late fattening stage were made. Outline of cattle in experiment 1 is shown in Table 1. Twenty-five heifers and fourteen steers were used during middle and late fattening stage from May 18th to June 7th in 1993 (Table 2). Chemical composition and nutritive value of ration is shown in Table 3.

Feed intake in the WLF period was calculated by deducting the leftover feed of 7 days after. The supply of concentrates in the DF period was done at 0830 and at 1500 h. The feed intake in the DF period was calculated by detecting the leftover feed at the feeding time from the feed offered. The supply of rice straw was done at 0830 and at 1530 h during both DF and WLF periods. Water and salt were given ad libitum during both DF and WLF periods. Behavioral observation was made for 12 h using a video camera three times each in the DF

Table 1. Outline of cattle in experiment 1

Herd	No. of cattle	Breed (No. of cattle)	Sex	Initial age (mo.)
1	7	F <sub>1</sub> * <sup>1</sup> (1), B* <sup>2</sup> (6)	Steers	22.1
2	7	B	Heifers	34.9
3	5	F <sub>1</sub> (1), H* <sup>3</sup> (1), B(3)	Heifers	21.2
4	7	F <sub>1</sub> (1), H(1), B(5)	Steers	21.0
5	7	B	Heifers	26.6
6	6	B	Heifers	32.9

\*<sup>1</sup> Holstein Friesian × Japanese Black\*<sup>2</sup> Japanese Black\*<sup>3</sup> Holstein Friesian

Table 2. Schedule of experiment 1

Herd No.	Experimental period		
	1993/5/18~5/24	5/25~5/31	6/1~6/7
1			
2	WLF* <sup>1</sup>	DF* <sup>2</sup>	WLF* <sup>1</sup>
3			
4			
5	DF* <sup>2</sup>	WLF* <sup>1</sup>	DF* <sup>2</sup>
6			

\*<sup>1</sup> Weekly lump feeding\*<sup>2</sup> Daily feeding

Table 3. Chemical composition and nutritive value of ration in experiment 1

Diet	Moisture	Crude fiber	Crude ash	Crude fat	Calcium	Phosphate	Digestible crude protein	Total digestible nutrients
	%	%	%	%	%	%	%	%
Rice straw	12.2	28.4	15.3	1.8	0.3	0.13	1.2	34.4
Concentrates	12.5	10.0	10.0	1.5	0.05	0.05	10.0	72.0

and WLF periods. Eating behavior was recorded at 2-min intervals and time spent in eating was calculated.

## 2. Experiment 2

Comparison of feed intake between DF and WLF during middle stage of fattening was made. Sixteen heifers and eight steers were used. Outline of the cattle and experimental schedule is shown in Tables 4 and 5. Chemical composition and nutritive ration are shown in

Table 6. The supply method of the feed and the measurement of feed intake were conducted according to the experiment 1.

Table 4. Outline of cattle in experiment 2

Herd	No. of cattle	Breed	Sex	Initial age (mo.)
1	8	B*	Steers	18.1
2	8	B	Heifers	18.8
3	5	B	Heifers	24.6

\* Japanese Black

Table 5. Schedule of experiment 2

Herd No.	Experimental period			
	1993/8/17~8/23	8/24~8/31	9/7~9/13	9/14~9/20
1				
2	WLF* <sup>1</sup>	DF* <sup>2</sup>	WLF* <sup>1</sup>	DF* <sup>2</sup>
3				

\*<sup>1</sup> Weekly lump feeding

\*<sup>2</sup> Daily feeding

Table 6. Chemical composition and nutritive value of ration in experiment 2

Diet	Moisture	Crude fiber	Crude ash	Crude fat	Calcium	Phosphate	Digestible	Total
							crude protein	digestible nutrients
	%	%	%	%	%	%	%	%
Rice straw	12.2	28.4	15.3	1.8	0.30	0.13	1.2	34.4
Concentrates	12.5	10.0	10.0	1.5	0.05	0.05	10.0	72.0
Lucerne hay cube	10.0	26.8	11.5	2.6	1.33	0.29	10.4	49.4

## Results and Discussion

Nutritional intake of cattle in experiment 1 is shown in Table 7. There were no significant differences in dry matter intake, total digestible nutrients and digestible crude protein contents of concentrates between WLF and DF, though they showed a tendency to be higher in the WLF than DF. On the other hand, dry matter intake of rice straw showed to be higher in the DF than WLF. It is indicated that these results may cause a positive effect on beef production due to higher quality of meat. Therefore, the WLF system can be used as one of practical feeding methods from the middle to the late fattening period. As shown in Table 8, eating time of WLF group was 16.3 min longer than that of DF group. This was because the

Table 7. Nutrition intake (kg/cow/day) in experiment 1

Diet	Treatment	No. of sample	Dry matter	Total digestible nutrients	Digestible crude protein
			(kg)	(kg)	(kg)
Rice straw	WLF <sup>*1</sup>	63	0.80±0.22	0.35±0.09	0.01±0.00
	DF <sup>*2</sup>	63	0.93±0.20	0.36±0.08	0.01±0.00
Concentrates	WLF <sup>*1</sup>	9	7.95±0.97	6.54±0.80	0.91±0.11
	DF <sup>*2</sup>	63	7.81±1.03	6.42±0.85	0.89±0.12

\*<sup>1</sup> Weekly lump feeding\*<sup>2</sup> Daily feeding

Table 8. Time spent in eating by beef cattle (min/cow /12 hours) in the day time

Treatment	Eating time
WLF <sup>*1</sup>	67.8
DF <sup>*2</sup>	51.5

\*<sup>1</sup> Weekly lump feeding\*<sup>2</sup> Daily feeding

Table 9. Nutrition intake (kg/cow/day) in experiment 2

Diet	Treatment	No. of sample	Dry matter	Total digestible nutrients	Digestible crude protein
			(kg)	(kg)	(kg)
Rice straw	WLF <sup>*1</sup>	42	0.83±0.05a	0.32±0.05a	0.01±0.00
	DF <sup>*2</sup>	42	0.69±0.13b	0.27±0.02b	0.01±0.00
Concentrates	WLF <sup>*1</sup>	6	6.45±0.33	5.31±0.24	0.94±0.03
	DF <sup>*2</sup>	42	6.34±0.43	5.22±0.31	0.93±0.04
Lucerne hay cube	WLF <sup>*1</sup>	6	0.67±0.00	0.37±0.00	0.08±0.00
	DF <sup>*2</sup>	42	0.67±0.00	0.37±0.00	0.08±0.00

\*<sup>1</sup> Weekly lump feeding\*<sup>2</sup> Daily feeding

a, b (p&lt;0.01)

eating behavior during 0700-0800h and 1500-1700h was more actively exhibited in the WLF than DF.

Feed intake of cattle in experiment 2 is shown in Table 9. Dry matter and total digestible nutrients of rice straw of WLF were significantly higher than those of DF. And, concentrates were consumed by cattle in the WLF than DE period by 110g (head/day).

Especially, from the standpoint of the establishment of labor-saving WLF is effective. Ensminger<sup>4)</sup> proposed the followings by the management of feedlot cattle. "Limited feeding generally decreases the rate of gain, adversely affects feed conversion, and increases cost of

gains. Under most conditions, cattle should be full fed throughout the finishing period." However, Cunningham and van Tienhoven<sup>3)</sup> put a conclusion that chicken with full feeding had larger body weights, weight gains, and consumed more feed. Cunningham and Polter<sup>2)</sup> conclude that egg incomes over feed costs were the greatest for the restriction programs initiated from 38 and 45 weeks of age. Furthermore Cunningham<sup>1)</sup> supposed that chicken with full feeding in the young stage did not bring about a maximum account. A series of studies conducted by Cunningham et al.<sup>1-3)</sup> suggest the need for the studies on the development of rational feeding techniques and the same seems to be true of fattening beef cattle.

Further information is needed on daily gain and meat quality in the future.

### References

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### Summary

This experiment was conducted to clarify the difference in feed intake of beef cattle middle and late fattening period between the feeding concentrates twice a day (FD) and weekly lump feeding (WLF). Thirty-nine cattle (6 herds) in experiment 1 and twenty-four cattle (3 herds) in experiment 2 were used. Experiments 1 and 2 were carried out from 5/18 to 6/7 and 8/17 to 9/20 in 1993, respectively.

The results obtained were as follows:

1. There were no significant differences in dry matter intake, total digestible nutrients and digestible crude protein of ration between WLF and DF during middle and late fattening stages in experiment 1.
2. Eating time of cattle in WLF was 16.3 min longer than that in DF in experiment 1.
3. In experiment 2, dry matter intake and total digestible nutrients of rice straw in WLF were significantly higher than those in DF ( $p < 0.01$ ).
4. Though the feed intake of concentrates tended to be higher in WLF than DF, there was no significant difference between treatments in experiment 2.