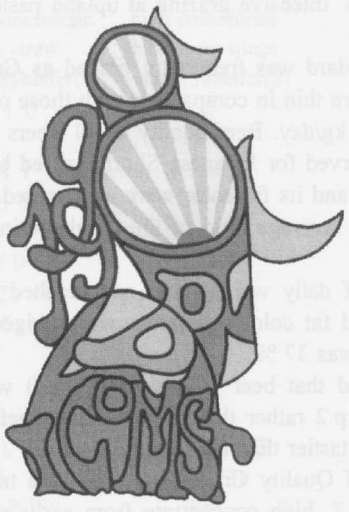
PS 11

Poster session and workshop 11

Integrated meat chain



Thursday, September 3rd
11:15h-12:45h

HIGH QUALITY LEAN MEAT PRODUCTION AND CONSUMERS' PREFERENCE IN JAPAN(1)
- PRODUCTION SYSTEM OF JAPANESE SHORTHORN BEEF BY GRAZING AND FATTENING -

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BACKGROUND

Under the present evaluation system,Japanese beef is basically graded by the marbling score. In this connection, most steers of Japanese Black, Japanese Brown (Japanese indigenous beef cattle) and Holstein are fattened by high concentrate diet with low roughage like rice straw. Especially ,Japanese Black steers are fed for producing well-marbled beef for long period. However,such feeding system results in metabolic disorder of cattle and excessive fat in carcass, and makes Japanese beef production high cost. On the other hand, Japanese Shorthorn steers, one of Japanese indigenous beef cattle, are fed in Tohoku District located in northern Japan where grass resources are abundant. Most their cows bred on pasture calve form March to April and are grazed during the warm season (May-November) with calf, while they are housed in winter (December-April). Their calves are fattened after grazing and slaughtered for beef from December to April (Figure 1). They produce lean meat at low cost.

OBJECTIVES

In order to establish a feeding system for summer born steers/heifer and year-round shipping of Japanese Shorthorn beef, by using grass resources in Tohoku District, We studied (1) possibility to achieve high live weight gain in the second grazing period and (2)fattening period and feeding level of concentrate with roughage.

METHODS

1)Grazing: As shown in Figure 1, summer (July - August) born steers and heifers of Japanese Shorthorn were grazed again during the next season for about 150 days from May to October at upland pasture (area 6.4ha, alt.900-950m,lat.39° 50′ N). Pasture was divided into four paddocks. Grazing interval was one week. Crossbred steers(Japanese Black × Holstein) were grazed at the same pasture for comparison.

2)Fattening: Fattening for steers aged 14-15 months was started from November . Three types of Experiment were conducted. Feeding levels of concentrate were low (5kg/day) at the early fattening stage and high (9.5 kg/day) at the late stage in Exp.1.while feeding level was set higher (9.5 kg/day) during the whole period in Exp.2. Feeding level in Exp.3 was 8kg of concentrate in a day during the whole period. Hay and low moisture silage ad libitum were fed as roughages at the early stage in all Experiments. As roughages during the late stage, 2 to 3 kg rice straw a day was fed in Exp.1 and Exp.2 , and hay and low moisture silage ad libitum were fed in Exp.3. Feeding period was 8 - 12 months.

3)Sensory evaluation: The sirloins of two steers produced in Exp.2 and 3 were used to sensory evaluation respectively by retailers and restaurateurs. Loins were cooked as they usually do.

RESULTS AND DISCUSSIONS

1) Average daily live weight gains of Japanese Shorthorn steers and heifers were 0.78 to 0.92 kg. and were higher than those of Crossbred (Table 1). Cool climate for animals in summer and high concentration of digestible component in grass shown in Figure 2 may result in high daily live weight gain. Intensive grazing at upland pasture is effective to rear summer born steers and heifer.

2) In Exp.1,beef quality under the Japanese Standard was frequently graded as Grade 1(Inferior) ,because of its rough firmness and texture,and dark beef color,while back fats were thin in comparison with those of Exp.2 and 3 (Table2).

3) In Exp.2,average daily gain of steers was 0.92 kg/day. Beef quality of all steers by the Japanese Standard was ranked at Grade 2 (Below Average). This grade is commonly observed for Japanese Shorthorn fed by conventional fattening(form 8 months of age for 12 to 16 months without grazing). Beef color and its fat color were also scored common grade. On the other hand, thick back fat showed excessive fat in the carcass (Table 2). Average ratio of the roughage intake to the total diet throughout their fattening period was 23 %.

4) Steers and heifers in Exp.3 obtained 0.9kg of daily weight gain and reached to 687kg of body weight at slaughter on the average. Beef Quality was ranked at Grade 2 and fat color of carcass were judged as slightly yellow for the Japanese Standard (Table 2). Average ratio of roughage to total diet was 37 % .

5) Most participants in the sensory test evaluated that beef produced in Exp.3 was tastier than that of conventional fattening. Number of participants who preferred beef of Exp.2 rather than conventional beef was almost same with that of those who did not prefer. This result shows that beef of Exp.3 is tastier than that of Exp.2.

6) Beef price of Quality Grade 1 is low. Beef of Quality Grade 2 is used as a trading index for evaluating quality of Japanese Shorthorn. For producing beef of Quality Grade 2, high concentrate from early stage like Exp.2 and 3 is recommendable as a reasonable method for fattening steer/heifer under the 2 season grazing system. As this feeding system tends to increase back fat of carcass however, it is necessary to reduce excessive fat and improve cutability by shortening the fattening period or lowering concentrate level between Exp.1 and 3.

CONCLUSION

Feeding system combined grazing with fattening of high roughage diet for Japanese Shorthorn is effective to produce more tasty beef .This system utilizes abundant grass resources in Tohoku District in Japan and makes it possible to provide various meat for consumers with well-marbled beef by Japanese Black.

PERTINENT LITERATURE

Japan Meat Grading Association. STANDARD FOR USE IN TRANSACTION OF DRESSED BEEF CARCASSES(1988)

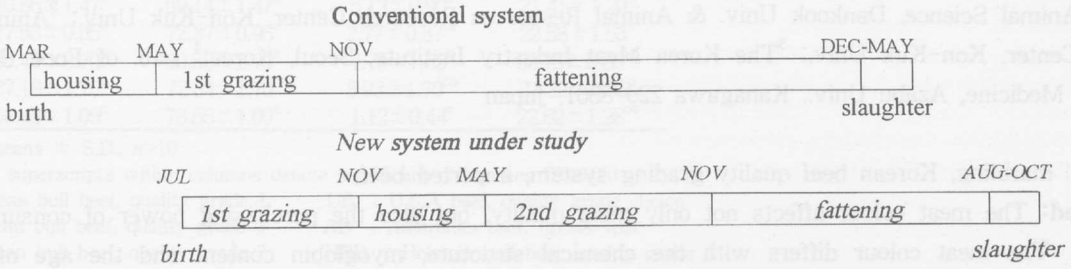

Figure 1. Comparison between conventional feeding system(above) and new system under study (below) of Japanese Shorthorn.

Table 1. Rearing on upland pasture of summer born steer/heifer of Japanese Shorthorn in 2nd grazing compared with Crossbred (Japanese Black × Holstein)

	Breed		Initial wt. (kg)	Daily Gain (kg/day)
1st trial	J.S. [1]	steer	282	0.78
	B.H. [1]	steer	249	0.63
2nd trial	J.S. [1]	steer/heifer	251	0.92
	B.H. [1]	steer	217	0.82

[1] Japanese Shorthorn (J.S.) and Crossbred (B.H.) were grazed at the same pasture(0.3 animal/ha). Pasture characteristics are orchardgrass ,timothy and perennial ryegrass

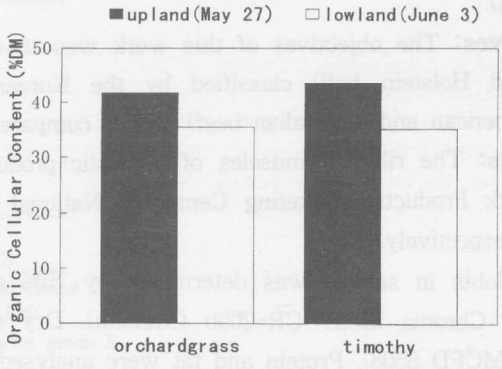

Figure. 2 Digestible component of grass at upland (alt. 900m) and lowland(alt. 160m).

Table 2. Fattening of Japanese Shorthorn after 2 seasons grazing

	Exp. 1	Exp. 2	Exp. 3
Early stage	low concentrate hay, grass silage	high concentrate [1] hay, grass silage	high concentrate [2] hay, grass silage
Late stage	high concentrate [1] rice straw	high concentrate [1] rice straw	high concentrate [2] hay, grass silage
Numbers of animals	steer(12) [3]	steer(8)/heifer(4)	steer(3)/heifer(3)
Fattening period (months)	8－12	10	12
Initial weight (kg)	436	411	379
Slaughter weight (kg)	671	687	698
Daily gain (kg/day)	0.80	0.92	0.89
Carcass weight (kg)	375	394	410
Back fat thickness [4] (cm)	1.9	2.6	2.7
Rib eye area [4] (cm^2)	42.6	45.0	47.0
Japanese Carcass Grade Standard			
Marbling(B. M. S. No.) [5]	2(12) [3]	2(12)	2(6)
Fat color(B. F. S. No.) [6]	4(5), 3(7)	4(5), 3(7)	5(1), 4(2), 3(3)
Beef color(B. C. S. No.) [7]	6(4), 5(7), 4(1)	5(2), 4(10)	4(3), 3(3)
Beef Quality Grade [8]	1(10), 2(2)	2(12)	2(6)

[1] 9. 5kg/day [2] 8kg/day [3] values in the parentheses are number of animals

[4] between 6th and 7th ribs.

[5] beef marbling standard number, rating from 1:none to 12:very abundant

[6] beef fat standard number, rating from 1: white to 8:very yellow.

[7] beef color standard number, rating from 1:bright to 8:dark.

[8] Beef quality grade is to be evaluated by marbling, beef color, fat color and texture and firmness (Grade 1:Inferior , Grade 2:Below Average , Grade 3:Average Grade 4:Good Grade 5:Excellent)

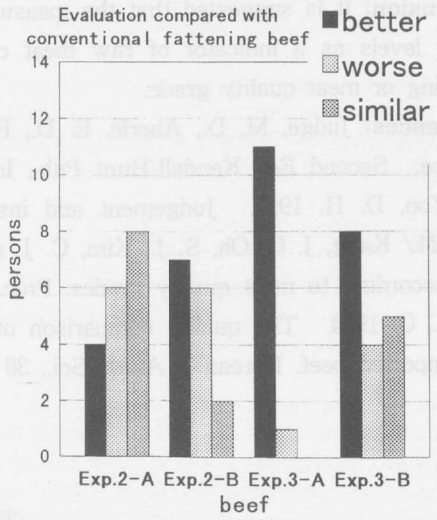

Figure 3 Evaluation of tastes of sirloins produced in 2 season grazing and fattening system by retailers and restaurateurs