

EFFECT OF TMR USING WHOLE CROP RICE SILAGE ON CARCASS QUANTITY AND QUALITY OF KOREAN NATIVE CATTLE.

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Abstract—The use of paddy field for feed production has become an important issue in Korea. Above 0.8 million tons of forage was imported and 0.25 million ha of paddy field will not be cultivated for grain rice in 2014. Fourteen Hanwoo steer were used in a completely randomized design experiment to investigate the effect of TMR feeding using whole crop rice silage on the carcass quantity and quality of Korean native cattle. Initial body weights of each group were 284kg and final weights of control and WCR-TMR (whole crop rice TMR) group at 29 months of age were 631 and 647kg. Average daily gain (ADG) of WCR-TMR group was higher than control by 22 months. But retarded gain was observed in WCR-TMR group at later fattening period. Carcass quality of Hanwoo was improved by feeding WCR-TMR. Back fat thickness was decreased and marbling score was higher by 7.1. The appearance of 1st quality grade of WCR-TMR was 100%. WCR-TMR had no significant difference on rib eye area, meat color, firmness, maturity, and meat yield index. Therefore, using whole crop rice for feed will be recommendable as improving carcass quality in Korean native cattle and making an alternative idea for resolving the over-stock of grain rice in Korea.

Index Terms—Whole crop rice silage, Korean native cattle (Hanwoo), Carcass quality.

I. INTRODUCTION

Above five million tons of forages are fed to ruminants in Korea, but half of them rely on rice straw as roughage and 0.8 million tons of forage was imported. The lack of forage results in increased imports of concentrate feeds and increased production cost. Now, Korea has about 0.9 million hectares of rice fields, but as a consequence of world trade negotiation, Korea already have been opened the rice market from 2008 (MIFAFF, 2009). It is expected that due to aging farmers and lower rice price, about 0.25 million ha of paddy field will not be cultivated for grain rice. Therefore, we suggest that whole-crop rice cultivation for feeding beef and dairy cattle.

For fattening of Holstein cattle, when feed whole crop rice silage was lower body weight and meat quality, evaluated on the basis of texture and firmness (Nakanishi, 2006). There have been reports indicating lower meat quality when WCR silage was given throughout the fattening period, compared to when it was given only during the early period (Shinoda, 2002).

The purpose of this study was to investigate the effect of TMR feeding using whole crop rice silage on the carcass quantity and quality of Korean native cattle.

II. MATERIALS AND METHODS

The whole crop rice silage was harvested at yellow ripen stage and ensiled for 60 days. The whole crop rice silage TMR (WCR-TMR) used in this study consisted of 30~45% whole crop rice silage, 10~20% barley brewers grain, 10% corn, and 8~10% rice bran. Fourteen Hanwoo steers to produce high quality beef fed commercial TMR (Control) and WCR-TMR by 29 months of age.

III. RESULTS AND DISCUSSION

Initial body weights of each group were 284kg. Final body weights of control and WCR-TMR group at 29 months of age were 631 and 647kg, respectively. Average daily gain (ADG) was greater in WCR-TMR group than control by 22 months of age (0.70 vs 0.71). But retarded gain in WCR-TMR was observed at later feeding period. Overall ADG of WCR-TMR group was higher by 6% than control.

Quantity and quality grade of carcass from WCR-TMR group were better than control group. Back fat thickness of WCR-TMR group was thin than control and marbling score was higher in WCR-TMR by 7.1. Percentage over 1st grade appeared in control and WCR-TMR group were 86 and 100%, respectively.

A common feeding method of growing and fattening of beef cattle is to promote fat accumulation in skeletal muscle

tissue by controlling the vitamin A in the blood of cattle (Shinoda, 2002). Therefore, the attention must be given to feeding whole crop rice silage to fattening cattle because of β -carotene rich rice straw is included in whole crop rice silage (Nakanishi, 2003).

Table 1. Live weight and daily gain of Korean native cattle by whole crop rice TMR

Item	Control	WCR-TMR
Body weight (kg)		
Initial (Age of 9 mon.)	284 ^a	284 ^a
12 mon.	364 ^a	375 ^a
18 mon.	453 ^b	473 ^a
22 mon.	581 ^b	603 ^a
29 mon.	631 ^a	647 ^a
Average daily gain (kg)		
Initial~12 mon.	0.85 ^b	0.98 ^a
13~18 mon.	0.72 ^b	0.79 ^a
19~22 mon.	0.70 ^a	0.71 ^a
23~29 mon.	0.59 ^a	0.52 ^a
Overall period	0.71 ^b	0.75 ^a

Table 2. Carcass characteristics of Korean native cattle by whole crop rice silage TMR

Item	Control	WCR-TMR
Quantity grade		
Back fat thickness (mm)	11.7 ^a	9.3 ^b
Rib eye area (cm ²)	85 ^a	84 ^a
Carcass weight (kg)	398 ^a	397 ^a
Meat yield index	65.55	67.12
Grade (A : B : C)	3 : 3 : 1	5 : 2 : 0
Quality grade		
Marbling score	5.6 ^b	7.1 ^a
Meat color	4.7 ^a	4.7 ^a
Fat color	2.9 ^a	3.2 ^a
Firmness	1.1 ^a	1.0 ^a
Maturity	2.1 ^a	2.1 ^a
Grade (1 ⁺⁺ : 1 ⁺ : 1 : 2 : 3)	1 : 3 : 2 : 0 : 1	3 : 3 : 1 : 0 : 0

IV. CONCLUSION

The challenge of using whole crop rice for supplying dairy and beef cattle as whole crop silage is being rapidly advanced. The planted area of whole crop rice for use as feed was about 200ha in 2010. In this reason, we must to investigate the effect of TMR feeding using whole crop rice silage on the carcass quantity and quality of Korean native cattle. Final body weights of control and WCR-TMR group were 631 and 647kg, respectively. WCR-TMR group was higher body weight than control. Also, average daily gain (ADG) was greater in WCR-TMR group than control.

Quantity and quality grade of carcass from WCR-TMR group were better than control group. Back fat thickness and marbling score was improved in WCR-TMR. Percentage over 1st grade appeared in WCR-TMR group was 100%.

Therefore, using whole crop rice for feed will be recommendable as improving carcass quality and making an alternative idea for resolving the excess stock of food rice in Korea.

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