Influence of Drylot feeding at Different Altitudes on Slaughtering Performance and Meat Nutrients Composition of Yaks

Jiuqiang Guan[1], Qin Bai[1], Xiangfei Zhang[1], Jianxu Zhou[2], Yongliang Chao[3], Tianwu An[1], Yuanjie Zhao[3], Hongwen Zhao[1], Xiaolin Luo[1*]

[1]Institute of Plateau Animals, Sichuan Academy of Grassland Sciences, P. R. China

[2] Xiaojin County Science and Technology and Agriculture, Animal Husbandry and Water Affairs Bureau, P. R. China

[3] Haidong City Agricultural and Rural Affairs Bureau, P. R. China

*Corresponding author email: luoxL2004@sina.com

I. INTRODUCTION

Yak is the primary plateau livestock distributed on the Qinghai-Tibet Plateau, with a population of approximately 14.45 million (2022), which constitutes the pillar industry in the high-altitude areas of China. The yak industry plays a vital role in the economic and social development of the Qinghai-Tibet Plateau. However, due to the traditional grazing feeding pattern and the seasonal imbalance of feed supply, overgrazing, long raising cycle and poor meat quality of yaks continue to be inevitable issues in the industry. To address the challenges, studies have been carried out to explore the practice of transferring yaks from the Qinghai-Tibet Plateau to lower-altitude plains with drylot feeding pattern, in consideration of reducing grazing pressure of pasture, utilization of feed resources in the plain region and improving feeding efficiency. In this study, the growth, slaughtering performance, and meat quality of stall-fed yaks at different altitudes were compared to evaluate the feasibility of low altitude drylot feeding for yaks.

II. MATERIALS AND METHODS

Approximately 18 months old male yaks were selected for the experiment, which was conducted in Guanghan(low altitude 600 m, LA, n=6). The ratio of concentrate to roughage was 5:5. Yaks (n=6) with a natural grazing system in Hongyuan City (high altitude 3500 m, HA) were chosen as the control group. At the end of the experiment, LA and HA groups animals were humanely slaughtered and phenotypic data on carcass weight. The longissimus dorsi samples were transported to a refrigerator (−20 °C) in the laboratory to measure meat quality.

Table 1: Time, Altitude, and Temperature of experimental Areas

Region	Altitude (m)	Numbers of Animals (n)	Extreme High Temp (℃)	Extreme Low Temp (℃)	Average Temp (℃)
LA	600	6	36	-1	14.5
HA	3500	6	24	-22	-0.7

III. RESULTS AND DISCUSSION

（1）Growth and Slaughter Performance

Yaks in the HA group showed the slowest growth with an ADG of 145 g/d. Yak in the LA and HA groups were slaughtered at body weights of 193 kg and 152kg, respectively. The results also revealed greater carcass weight, net meat weight, and dressing percentage in the LA group compared to the HA group(Table 2).

Table 2: Growth and Slaughter Performance of Yaks at Different Altitudes

Group[1]	Initial Weight (kg)	Final Weight (kg)	Average Daily Gain (g)	Carcass Weight (kg)	Net Meat Weight (kg)	Dressing Percentage (%)
LA	130.83±35.75	193.33±40.41	268.24±42.86[a]	90.24±23.22[a]	71.25±18.44[a]	46.39±2.32[a]

HA	118.83±17.00	152.67±22.70	145.21±28.82[b]	59.38±22.49[b]	45.08±18.62[b]	42.51±2.63[b]

[1] Values in the same column with different letter superscripts differed significantly (P<0.05).

（2）Meat nutrient composition

The fat content of LA yak meat was significantly higher than that of the control group(HA). Moisture 、Ash and Protein no significant difference was observed in the comparison between LA and HA groups.

Table 3: Analysis of Meat Composition in Stall-Fed Yak

Group[1]	Moisture (%)	Ash (%)	Fat (g/100g)	Protein (g/100g)
LA	74.10±1.59	1.63±0.12	3.57±3.15[a]	22.37±0.61
HA	74.47±1.16	1.73±0.06	1.63±0.31[b]	23.07±1.21

[1] Values in the same column with different letter superscripts differed significantly (P<0.05).

（3）Meat quality of yaks at different altitudes

The IMF content and Inosine monophosphate of LA yak meat were significantly higher than that of the HA group; however, no significant differences were observed in other indicators between the LA and HA group.

Table 4: Quality analysis of yak meat for consumption

Index[1]		LA	HA
pH	pH45min	6.46±0.13	6.48±0.42
Colour difference	Brightness (L*)	31.43±4.31	32.95±2.58
	Redness (a*)	9.78±1.98	11.18±3.77
	Yellowness (b*)	6.97±1.67	9.00±1.76
Tenderness index	Cooked meat rate (%)	68.29±1.64	68.09±1.07
	Shear force (N)	5.57±0.74	7.51±2.42
	Intramuscular fat (IMF, %)	2.07±2.15[a]	0.41±0.05[b]
	Inosine monophosphate (IMP, g·kg-1)	0.55±0.07[a]	0.33±0.42[b]

[1] Values in the same row with different letter superscripts differed significantly(P<0.05).

The comparison of amino acid composition between the LA and HA groups did not show significant differences.

Table 5: Amino Acid Composition Analysis

Group[2]	TAA[1]	FAA	EAA/NEAA	FAA/TAA
LA	21.20±0.67	9.46±0.27	0.66±0.02	0.45±0.01
HA	21.43±1.30	9.52±0.53	0.66±0.01	0.44±0.01

[1]TAA=Total amino acids, FAA=Fresh amino acids, EAA/NEAA=essential/non-essential amino acids, FAA/TAAFresh amino acids/total amino acids

[2] Values in the same column with different letter superscripts differed significantly (P<0.05).

IV. CONCLUSION

In comparison with significant heat loss and forage deficiency during winter at high altitude area, the growth and slaughter performance of yaks can be enhanced by drylot feeding at lower altitude, which is also beneficial to the improvement of meat quality (Intramuscular fat, Shear force).

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