

THE EFFECT OF OIL PALM FRONDS AND NAPIER GRASS AS ROUGHAGE IN TOTAL MIXED RATION SUPPLEMENTED WITH BYPASS FAT ON MEAT QUALITY OF FEEDLOT CATTLE

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Abstract – This study was designed to investigate the effect of oil palm fronds and Napier grass as roughage in total mix ration (TMR) supplemented with bypass fat on meat quality of feedlot cattle. Oil palm fronds were used in order to utilize agricultural waste products in local area. Twelve steers were used in a 2x2 factorial in RCBD. Treatments were 1). TMR with oil palm frond and 0% bypass fat 2). TMR with oil palm frond and 5% bypass fat 3). TMR with Napier grass and 0% bypass fat and 4). TMR with Napier grass and 5% bypass fat. Significant differences were not observed in chemical composition of meat, but fat composition of meat groups supplemented with 5% bypass fat tended to be higher than 0% bypass fat ($P<0.05$). There were significant differences in pH value between treatments. The groups supplemented with 5% bypass fat had more rapid pH declines than groups supplemented with 0% bypass fat ($P<0.05$). There were significant differences between treatments in b^* , especially in groups supplemented with 5% bypass fat had a higher b^* than the groups supplemented with 0% bypass fat. TMR with Napier grass and 0% bypass fat showed the most tenderness in shear force value ($P<0.05$).

Key Words – Oil palm frond, Bypass fat, Meat quality, Napier grass

I. INTRODUCTION

A concentrate-based diet is frequently used to produce a high growth rate and meat quality of fattening cattle. However, the cost of this practice is very expensive. Seeking alternative feeds are by-products and waste products from the processing of various fiber crops or crop residues is expected to be necessary. Oil palm is an important crop of tropical countries and there are several by-products. Particular, oil palm frond has been given emphasis lately as it has great potential to be utilized as roughage source or as an ingredient for total mixed rations or as a complete and balanced feed to provide highly nutritional

diet that both maintain the health of the animal and increase the quality of end product (meat). The objective of this study was to find out whether the using oil palm frond as roughage in total mixed ration with bypass fat can compete with the using Napier grass as roughage in total mixed ration with bypass fat on meat quality.

II. MATERIALS AND METHODS

2.1 Animals and slaughtering

In the experiment, 12 Charolais crossbred cattle with 2 years old were fattened with similar level of protein content of total mixed rations (TMR) with two types of roughage (oil palm frond and Napier grass) and supplemented with 0 and 5% bypass fat. The cattle had been fed ad libitum on four treatments; 1) TMR with oil palm frond and 0% bypass fat, 2) TMR with oil palm frond and 5% bypass fat, 3) TMR with Napier grass and 0% bypass fat and 4) TMR with Napier grass with 5% bypass fat for 8 months and then transported to a commercial slaughterhouse and slaughtered under standard condition

2.2 Meat quality measurements

Samples of *M.longissimus dorsi* were removed from 12 bull's carcasses. All samples were cut and immediately vacuum packaged and stored at 4 °C for analysis pH (SevenGo™ pH meter SG2, Mettler Toledo, Thailand), meat color (CIE L^* , a^* and b^* /Illuminant C, 0° observer), tenderness (Instron Universal Testing Machine Model 1011, Instron Corporation, USA) and chemical composition of meat (percentage of moisture, protein, fat and ash). [1]

2.3 Statistical analysis

The data were analyzed using the Statistical Package for the Social Sciences software (SPSS) version 16.0

and differences among treatment means were analyzed using the Duncan's Multiple-Range Test (DMRT). Statistical significance was declared at $P < 0.05$.

III. RESULTS AND DISCUSSION

Significant differences were not observed among groups for chemical composition of *M. longissimus dorsi* ($P > 0.05$). However, the results in this study showed that fat composition in *M. longissimus dorsi* of groups supplemented with 5% bypass fat tended to be

higher than groups supplemented with 0% bypass fat (Table.2)

Table 1. Chemical composition of TMR diet (%DM)

	TMR with Oil palm fronds	TMR with Napier grass
DM	66.6	58.3
CP	12.00	13.13
EE	4.87	5.16
NDF	65.12	67.45
ADF	20.88	20.33
ADL	-	-
Ash	9.27	5.21
Energy	-	-

Table 2. Chemical composition of *M. Longissimus dorsi*

Treatments	TMR with Oil palm frond		TMR with Napier grass		SEM ¹	Contrast ²		
	0% bypass fat	5% bypass fat	0% bypass fat	5% bypass fat		R	S	R x S
Chemical composition of meat								
Moisture	72.03±1.79	69.82±1.65	72.54±0.94	71.71±0.67	0.39	0.16	0.09	0.40
Crude protein	87.22±5.55	78.54±6.90	85.19±4.12	83.30±2.99	1.47	0.66	0.11	0.28
Ether extract	7.91±5.36	11.83±4.31	8.37±2.45	11.25±6.04	1.37	0.98	0.25	0.85
Ash	4.13±0.29	3.80±0.29	4.19±0.21	3.87±0.32	0.08	0.69	0.08	0.95

¹Standard error of the treatment means.

²P-value for the effect: R = roughage source; S = supplemented with bypass fat; R x S = roughage source x supplemented with bypass fat interaction.

Table 3. Effect of using oil palm fronds and Napier grass as roughage in total mixed ration (TMR) supplemented with bypass fat on meat quality of feedlot cattle

Treatments	TMR with oil palm fronds		TMR with Napier grass		SEM ¹	Contrast ²		
	0% bypass fat	5% bypass fat	0% bypass fat	5% bypass fat		R	S	R x S
pH	6.20±0.54	5.45±0.03	6.73±0.15	5.78±0.32	0.09	0.05	0.00	0.59
Meat color								
<i>L</i> *	24.83±5.20	34.91±4.79	23.83±2.74	31.79±6.64	1.45	0.50	0.02	0.73
<i>a</i> *	14.26±3.78	20.41±1.63	13.58±1.97	16.29±2.90	0.78	0.16	0.02	0.30
<i>b</i> *	10.92±4.02	18.07±0.88	10.09±0.64	14.17±3.99	0.83	0.19	0.01	0.38
Shear force value (kg)	7.71±3.46	8.15±0.41	4.00±0.42	7.98±0.99	0.53	0.10	0.07	0.13

¹Standard error of the treatment means.

²P-value for the effect: R = roughage source; S = supplemented with bypass fat; R x S = roughage source x supplemented with bypass fat interaction.

There were significant differences between treatments in pH values of groups supplemented with 0% and 5% bypass fat ($P < 0.01$), the groups supplemented 5% bypass fat had lower pH value than 0% bypass fat. When pH decreases rapidly before the muscle has been chilled, sarcoplasmic and myofibrillar proteins are partially denatured, resulting in pale color. [3] an stronger relationship between pH and *L** value indicating that lighter colored beef would have a lower pH. most rapid pH decline, and the highest *L** values. [9]

There were significant differences between treatments in *b** (yellowness) of groups supplemented with 0%

and 5% bypass fat ($P < 0.05$), *b** (yellowness) was related to fat composition in meat [2] or intramuscular fat especially in groups supplemented with 5% bypass fat which has higher in fat composition in meat than groups supplemented with 0% bypass fat (Table. 3)

Shear force value of TMR with Napier grass 0% bypass fat was significant lower from other groups ($P < 0.00$). as opposed to several studies [4] [6] [7] have reported that slightly dark beef with a moderately high pH tends to be tougher than brighter colored meat with a normal ultimate pH. Moreover, [8] found that *b** values (yellow) had a stronger positive relationship to tenderness than *L** values (lightness). (Table.3)

IV. CONCLUSION

The using oil palm frond as roughage in total mixed rations to fattening cattle in long term for meat quality found that supplementation of 5% bypass fat had no negative effect and also can adjust the proper acid-base balance of pH but for the tenderness the using oil palm frond as roughage in total mixed ration support to be developed

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