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Biochemical Components of Beef

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Ten cow muscle samples from 6th and 12th rib sections were used to evaluate of beef biochemical parameters. The concentrations of fat in longissimus muscles were lower for 12th rib than 6th rib. By contrast, the longissimus pH concentrations were higher in 6th rib. There were no effects of muscles from different rib sections on the moisture and ash concentrations. There were found positive correlations between longissimus fat rates and incomes from carcass and total (carcass + haslets). However, significant negative correlations between longissimus pH rates and all incomes (from carcass, haslets and total) were found. The most striking finding in the study was that the changes in chemical parameters of beef may be important estimation criteria for economic and technical comments.

Key Words: Beef biochemical components, Technical, Economical importance.

INTRODUCTION

Comprehensive studies have revealed large chemical differences among meats for most bioeconomic traits[1,2]. The chemical findings on meat from different rib sections were not available for technical and economical comparison. Recently, particular attention has focused on the health problems associated with chemical components such as fat and cholesterol in animal products. It is also compared the chemical components of lonsissimus muscles from 12th and 6th rib to finding the most favourable meat for human health. Studies of the chemical composition of milk[3-5] and meat[6,7] have made a considerable contribution to advances in developing and utilization of the animal products. The chemical components of meat may be important selective criteria for economic meat production. Most coefficients of Pearson's correlations between the chemical parameters from blood, milk or meat of animal material and product traits were in the well-known directions and reflected the well-orchestrated endocrine changes and metabolic adaptations[8]. But there were no reports on correlations between chemical components of muscles from different sections and economic data. Therefore, these correlations by using Pearson correlation coefficients have been obtained in this study.

EXPERIMENTAL

In the present study, 10 longissimus samples from 6th rib and from 12th rib were used. The cows in this study were chosen from a raiser herd. Cows were fed a concentrate diet containing 12 % crude proteins and 2.3 ME Mcal/kg and wheat straw, approximately for 3 months.

Animals were slaughtered at the end of the fattening period in a commercial facility. The cows were assigned to slaughter group on a random basis stratified by weight based on the last weight taken before the start of slaughter schedule. The weights of carcasses and haslets were recorded. The meat samples (longissimus) from 6th and 12th ribs were grounded and sampled for determination of chemical components. The grounded samples were analyzed and determined using standard procedures[9] for moisture, ash, protein, fat and pH. Marketing price from beef was calculated from cows ($ 6.4/kg carcass, $ 3.6/kg liver, $ 0.7/kg lung, $ 2.8/kg heart, $ 2.8/kg kidney).

All of data are indicated as mean ± SEM. Comparisons were done by using independent samples t-test. Correlations between meat chemical parameters and economic merits were calculated using the Person correlation coefficients with the help of the SPSS[10].

RESULTS AND DISCUSSION

Means of chemical parameters of muscles from different rib sections were listed in Table-1. As shown in Table-1, the concentrations of fat were lower ($p < 0.05$) for 12th rib muscles than 6th rib muscles. Similarly, the concentrations of pH were also lower ($p < 0.05$) for first group (12th rib). There were no effects of rib muscles on the moisture and ash concentrations. The chemical components in the longissimus muscles of both groups were compatible with the report of Gregory *et al.*[11] for longissimus muscle.

TABLE-1
CHEMICAL PARAMETERS IN LONGISSIMUS MUSCLES

Rib section	Moisture (%)	Ash (%)	Fat (%)	Protein (%)	pH
12th	65.9 ± 2.1	1.1 ± 0.1	2.5 ± 0.6*	20.1 ± 0.3	5.63 ± 0.1
6th	62.8 ± 1.6	1.0 ± 0.1	4.2 ± 0.4	20.0 ± 0.2	5.71 ± 0.1*

*$p < 0.05$

In this study, the higher pH concentrations of muscle from 6th rib may be advantage for eating quality. However it is disadvantage for shelf life of product. The shorter shelf life negatively effects on salability of meat. The muscle quality traits must include suitable pH that indicates eating quality

and shelf life. Lower pH value is related to greater losses during further meat processing and high pH value is related to shorter shelf life but also better eating quality[12]. However, the high amounts of fat in the 6th rib muscle may have a negative effect upon consumer's preference and health. The consumer preference on meat salability is reduced when meats have excessively fat[13]. While increases in intramuscular fat and pH may be desirable over some range, excessive levels of these traits can be undesirable.

The differences in chemical components provide a potential opportunity to manipulate bioeconomic pathways in meat tissues to enhance quality characteristics and consequently commercial gain.

As shown in Table-2, there were found positive correlations between fat rate and incomes from carcass and total. There were no correlations between protein rate of muscles and incomes. There were negatively correlations between pH rates and all incomes. No correlations were observed between ash or moisture of meat and incomes.

TABLE-2
CORRELATION COEFFICIENTS BETWEEN EXPERIMENTAL DATA

Parameters	Correlation Coefficients	Parameters	Correlation Coefficients
Fat × C	0.65*	Ash × C	0.47
Fat × H	0.33	Ash × H	0.53
Fat × T	0.64*	Ash × T	0.48
Protein × C	0.55	Moisture × C	0.44
Protein × H	0.58	Moisture × H	0.10
Protein × T	0.56	Moisture × T	0.44
pH × C	-0.67*		
pH × H	-0.75*		
pH × T	-0.68*		

*$p < 0.05$; C = Carcass incomes; H = Haslet incomes; T = Total incomes.

The most striking conclusion in the study was that the changes in fat and pH levels of beef may be important estimation criteria for technical and economical comments. Further data on other sections of carcass are also needed to improve the interpretation of interrelationships between chemical components and incomes from meat. Meat quality traits including intramuscular fat and pH will be important in determining beef price and profits in the near future and perhaps in maintaining a market in the more distant future.

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