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Result of Fatty Acid Content in Meat of Selenge Breed Younger Cattle

Myagmarsuren Soronzonjav, N. Togtokhbayar, L. Davaahuu, B. Minjigdorj, Seong Gu Hwang

***Abstract*—**The number of natural or organic product consumers is increased in recent years and this healthy demand pushes to increase usage of healthy meat. At the same time, consumers pay more attention on the healthy fat, especially on unsaturated fatty acids. These long chain carbohydrates reduce heart diseases, improve memory and eye sight and activate the immune system. One of the important issues to be solved for our Mongolia's food security is to provide healthy, fresh, widely available and cheap meat for the population. Thus, an importance of the Selenge breed meat production is increasing in order to supply the quality meat food security since the Selenge breed cattle are rapidly multiplied, beneficial in term of income, the same quality as Mongolian breed, and well digested for human body. We researched the lipid, unsaturated and saturated fatty acid contents of meat of Selenge breed younger cattle by their muscle types. Result of our research reveals that 11 saturated fatty acids are detected. For the content of palmitic acid among saturated fatty acids, 23.61% was in the sirloin meat, 24.01% was in the round and chuck meat, and 24.83% was in the short loin meat.

***Keywords*—**Chromatogram, gas chromatography, organic resolving, saturated and unsaturated fatty acids.

I. Introduction

MONGOLIA is one of the few countries who have traditional nomadic livestock for centuries. Mongolian second dominant economic sector is Agriculture which is 13.67% of total GDP (Fig. 1) and livestock accounts for 90% of Agriculture sector in 2015 [15].

The source of Mongolian livelihood is nomadic livestock and it has been feeding Mongolian for thousands of years. Even now, livestock is the foundation of the country's economic basis. As a result, it is important to increase meat production and exports.

Increasing export income by increasing main trends of agriculture sector, specifically livestock goods production for export, becomes one of important policy goals in recent years. In 2015, 416.4 million dollars generated by exporting raw materials from agriculture sector, making share of 8.9% to overall income from total export. Income from exporting livestock raw material was 333.2 million dollars, making 7.1% of overall income of total export. [15]

Mongolian livestock had continuously grown for period 2002 to 2009 and slumped by 7.3 million in 2009-2010 according to livestock census. From 2010, number of livestock has been growing and amounted 56.0 million in 2015 livestock census. [15]

Myagmarsuren Soronzonjav is with the Mongolian University of Life Sciences, Mongolia (e-mail: s.myagmarsuren@muls.edu.mn).

Quality indicators of meat consumption as color, flavor, softness, and storage time significantly depend on the muscle fatty acids content. Since it is not possible to separate the muscle lipids from meat as fat reserves, muscle lipid is considered as an integral component of the meat. Due to its beneficial health effects [16], nutritionists highly recommend it.

Muscle fatty acid content depends on genetic and natural factors. The food fatty acid composition mainly affects muscle fatty acid, thus, animal fatty acid composition can be justified through animal food.

The quality of meat depends on the ratio of its major components - moisture, fat, protein, minerals, and content in the full and defective proteins. Animal breed, age and sex affect meat chemical composition. In this regard, the study of chemical composition and determination of biological value of meat of Selenge breed young cattle takes particular interest.

II. Previous Studies

A key indicator of the nutritional value of meat is its fatty acid content. Especially, muscle lipid affects meat tenderness and flavor and determines the nutritious and calorific quality [2]-[4], [6], [7], [12], [13].

Although Mongolian people consume fatty meat relatively more in their daily life, there is not enough study on the measurement of the fat quality [4].

Enkhtuya researched the content of fatty acid in meat of Mongolian cattle breed by muscle type [14]. Dumaa studied on the goat, sheep and horse meat of Mongolian breed and defined their fatty acid components by gas chromatography. The study result showed that content of palmitic acid was the highest (28.8%-35.04%) in the saturated fatty acids and no capron and tridecane acids were detected [5].

Badamkhand and Choi-Ish researched the content of fatty acid of goat meat. The research result showed that palmitic acid was 33.96% in the saturated fatty acid and oleic acid was 56.04% in the unsaturated fatty acids [1].

Although researchers have studied meat productivity [8]-[11], the fatty acid content in the meat of Mongolian Selenge breed needs for further research.

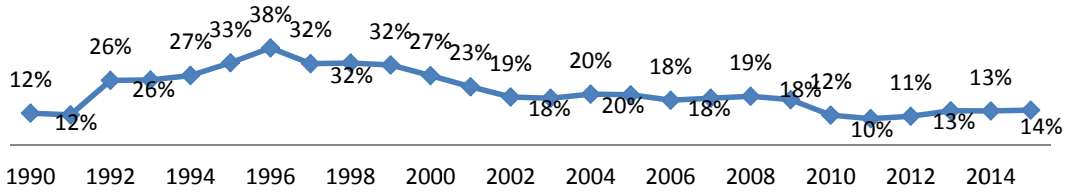

Fig. 1 The share of Agriculture Production in GDP

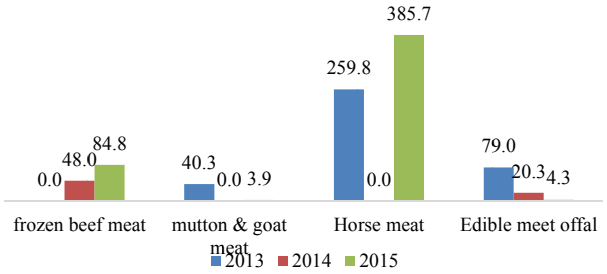

Fig. 2 The main livestock goods for export, ton

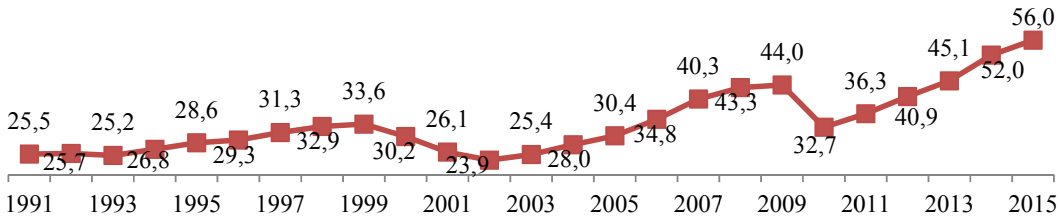

Fig. 3 The total number of livestock, millions

III. Materials and Methods

We conducted an experiment to fertilize Selenge young cattle breed in the Nart Research Center (Fig. 4) of Mongolian University of Life Sciences which located in Bornuur, Tuv Aimag, Mongoliain 2008 and 2009.

Fig. 4 Fertilizing the Selenge young cattle breed at Nart researcher center in 2009

The fatty acids content of meat was tested by gas chromatography method (HP-4890) in Food and Biotechnology Laboratory, Mongolian University of Science and Technology (Fig. 5).

Fig. 5 The Food and Biotechnology Laboratory in Mongolian University of Science and Technology in 2010

IV. Research Purpose

1. To define the saturated and unsaturated fatty acid content in samples of semimembranosus muscle, longissimus muscle, triceps brachii muscle and sirloin muscle of Young cattle.

2. To make conclusion on the research result by comparing with other researchers.

V. Results

We researched content of fatty acid of Selenge breed younger cattle by taking samples from the round meat, sirloin, short loin and chuck. And saturated fatty acids, short and long chain fatty acids are measured as shown in Figs. 6 and 7.

Measured results show that satured fatty acids contain 2.27-2.47% myristic acid, 17.88-18.17% stearic acid and 23.61-24.83% palmitic acid which is highest. However, short chain fatty acids contain 37.9-40.0% oleic acid and long chain fatty acids contain 4.43-5.43% lynolic acid, Table I.

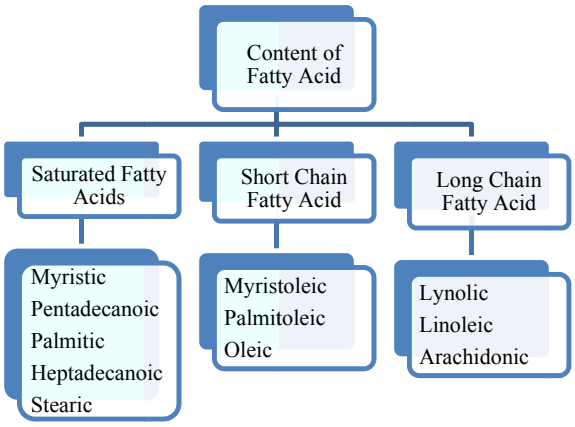

Fig. 6 Fatty acids content

TABLE I
Fatty Acids Content of Selenge Breed Younger Cattle, by Percent

Meat charts	Saturated fatty acids					Short chain fatty acids			Long chain fatty acids		
	Myristic acid	Pentadecanoic acid	Palmitic acid	Heptadecanoic acid	Stearic acid	Myristoleic acid	Palmitoleic acid	Oleic acid	Lynolic acid	Linoleic acid	Arachidonic acid
Sirloin	2.30	0.46	24.01	0.3	18.0	0.46	6.25	39.92	4.43	0.24	0.17
Round meat	2.47	0.49	24.01	0.41	17.88	0.08	6.14	37.90	5.43	0.04	0.17
Chuck	2.41	0.59	23.61	0.96	18.0	0.48	5.23	39.40	4.82	0.33	0.90
Short Loin	2.27	0.38	24.83	0.49	18.17	0.54	5.21	40.0	4.80	0.17	0.14

TABLE II
Chemical Composition, Fatty Acid 18 Months Young Cattle and Comparison with Other Researchers

Researchers	Saturated Fatty Acids					Short Chain Fatty Acids			Long Chain Fatty Acids		
	Myristic Acid	Pentadecanoic Acid	Palmitic Acids	Heptadecanoic Acid	Stearic Acid	Myristoleic Acid	Palmitoleic Acid	Oleic Acid	Lynolic Acid	Linoleic Acid	Arachidonic Acid
Sirloin	2.30	0.46	24.01	0.31	18.0	0.46	6.25	39.92	4.43	0.24	0.17
Round Meat	2.47	0.49	24.01	0.41	17.8	0.08	6.14	37.90	5.43	0.04	0.17
Chuck	2.41	0.59	23.61	0.96	18.0	0.48	5.23	39.40	4.82	0.33	0.90
Short Loin	2.27	0.38	24.83	0.49	18.17	0.54	5.21	40.0	4.80	0.17	0.14
Our Research	2.36	0.48	24.11	0.54	18.01	0.39	5.70	39.30	4.87	0.19	0.34
Yo. Dumaa [5]	2,54	2.30	35.04	3.06	0.52	5.63	5.63	38.46	9.93	0.20	0.31
B. Enkhtuya [14]	2.37	0.56	25.9	0.39	18.9	0.56	2.93	39.7	5.4	0.27	0.84

VI. Discussion

Lipid and fatty acids which is main ingredient part of lipid play many important roles of biology such as creating warm energy, distribute or protect the flexibility of membrane cover. Chemical and physical features of lipid depend on length of carbon chain and proper ratio of saturated and unsaturated fatty acids. When carbon atom of fatty acids increases its chain length and melting temperature are increased. But, if the ratio of unsaturated fatty acid increases melting temperature decreases. We shown the survey result in the Table II comparing with other researchers' results. Yo.Dumaa [5] stated that lamb contains 4.41 myrictic acid and 3.06 heptanoic acid.

According to the study of B. Enkhtuya [14], myristic acid is 2.37 and heptadecanoic acid is 0.39 due to the animal breed differences. Our research result shows that Selenge breed young cattle has palmitic acids 24.11% which is 1.79% less than the study of B. Enkhtuya [14] and heptadecanoic acid is 0.15% higher.

For the content of saturated fatty acids, palmitic acids are between 23.61% and 24.83% which are similar to the result Yo. Dumaa [5].

VII. Conclusion

We have identified the fatty acids in meat at the different parts of the muscles of Selenge breed younger cattle by muscle types and 11 of 14 saturated fatty acids are detected. Content of unsaturated and saturated fatty acids is 46.17% and 45.5% respectively of all fatty acids. Unsaturated fatty acids, including lanolin, linoleum and arachnid-an acid accounted for 11.7%. It reveals fatty acid compositions in meat of younger cattle are higher in terms of quality.

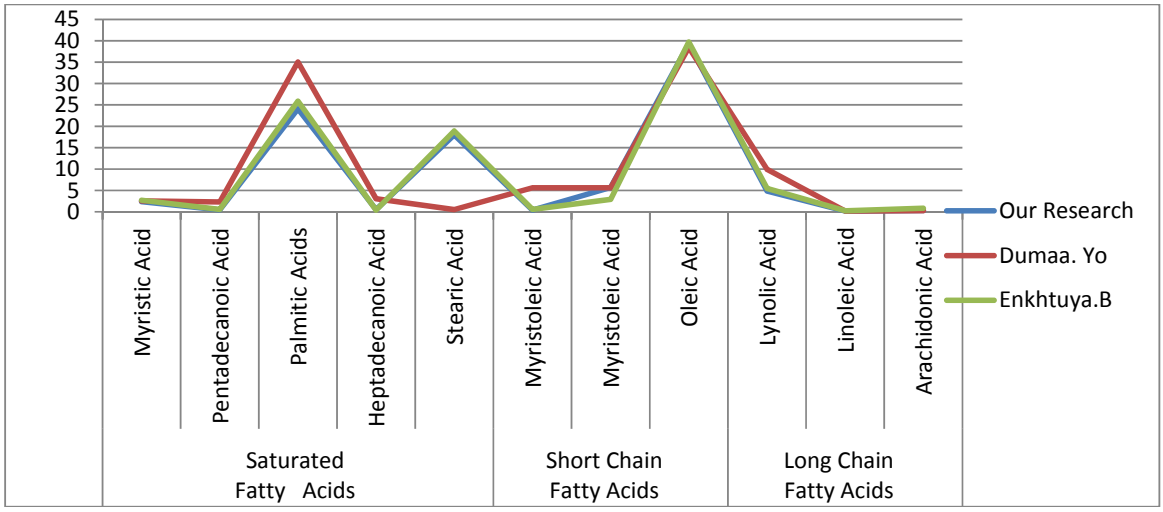

Fig. 7 Chemical Composition of Fatty Acid of 18 Months Young Cattle and Comparison with Other Studies

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