JOURNAL OF PURE AND APPLIED MICROBIOLOGY, May 2015. Vol. **9**(Spl. Edn. 1), p. 641-644

# Veterinary and Sanitary Assessment of Cattle Meat of Animals Infected with Salmonellosis

**Aida Bolatbekovna Abzhaliyeva, Kadyr Biyashevich BVyashev and Erkinbek Kanybekuly Kanzhigitov**

Kazakh National Agrarian University, Kazakhstan, 050002, Almaty, Abay 8, Russia.

(Received: 11 March 2015; accepted: 06 May 2015)

**Modern agricultural policy in our country is oriented to perform basic tasks – to meet the increasingly growing needs of people in food stuff. Episodes of salmonellosis are often characterized by a high mortality rate, it is difficult to deal with them, and they can last for a long time. In case of such episodes Salmonella are usually transmitted indirectly. People, animals, food and environmental objects can usually serve as the first initial source of infection. At present time the solution of problems aiming to ensure reliable and efficient protection of animals against infectious diseases, the production of safe raw materials of animal origin, high veterinary and sanitary quality of food are the main focus of fundamental and applied studies on the veterinary welfare in a particular region and in the whole country. These measures are important for the people's health.**

**Key words:** Salmonellosis, nutritional value, vitamins content, macronutrients and micronutrients, amino acid content.

Salmonellosis is a disease of young farm animals characterized by lesions of the gastrointestinal tract, joints and lungs. It is quite rare in severe clinical forms. Usually salmonellosis occurs in winter and spring and less in summer, grazing period. These are edible products of animal origin (meat and dairy) that are the main factors of the disease transmission. Food from meat of the slaughtered animals with unrecognized disease represents a serious danger. Food used without further thermal treatment also represents a serious danger. For a number of years we have seen episodes of food poisoning associated with the consumption of eggs or food prepared from raw eggs.

* To whom all correspondence should be addressed.

Extensive analysis of domestic and foreign literature has shown that dominant Salmonella serovars persisting in people are the following: S.dublin, S. enteritidis S. typhimurium, S.thompson, S. anatum [1; 2; 3].

An increase in the rate of S. typhimurium causing the disease and carriage of Salmonella in various animals and humans is widely observed in recent years. Participation of invertebrate and vertebrate animals as well as environment objects in the circulation of salmonellosis indicates the facultatively transmissive mechanism of the causative agent. All this makes it actual to study epizootic and epidemiological situation typical for this infection, reveals main driving forces of the infection, and also improves the specific prevention measures and veterinary health activities [4, 5, 6].

Low quality and safety of slaughter products from clinically healthy cattle and those affected with salmonellosis, meat and other

slaughter products of sick animals in a raw form are dangerous for human health and can cause the spread of infectious diseases among farm animals [7, 8].

Organs from carcasses of animals affected with salmonellosis have tuberous surface and dull gray color on their top.

According to the veterinary and sanitary examination, internal organs severely affected by Salmonella, as well as exhausted carcass with jaundice signs should be disposed. Successful fight against salmonellosis requires in-depth knowledge of epizootiology of the disease, serovariants of pathogen serotypes circulating in the region, natural and climatic features of the terrain and methods of animal husbandry [9, 10].

The aim of our research is to assess the quality and also veterinary and sanitary assessment of the beef products infected with salmonellosis. This article gives us the results of studies of cattle meat from animals affected with salmonellosis. We have studied the following parameters: nutritional value, content of vitamins, macronutrients and micronutrients, and amino acid content.

**Methods**

The work was performed at the Department of "Biological safetyî, and the "Veterinary and sanitary examination and hygiene" of KazNAU at the CJSC "Kazakh Academy of Nutritionî, and LLP "NUTRITEST".

In our work we used meat samples selected from slaughter animals with symptoms of salmonellosis and beef meat from healthy animals in the control group. Also samples of m. longissimus dorsi were taken in slaughtered cows kept in farms of Almaty region: peasant economy "Aydarbaevî and "Mezhdurechensk agroî served as the material for the study. Numerous pathological and bacteriological studies concluded that animals suffered from salmonellosis. Control samples were taken from healthy animals aged from 1 to 3 years. Meat was collected from the each studied carcass in one piece of at least 200 grams. Samples were stored in a freezer at the temperature of -10 °C. We used the method of high performance liquid chromatography (HPLC) in order to determine mass fraction of vitamins A and E. The method is based on the separation of vitamins from other compounds presented in the extract at chromatograph microcolumn and on its quantifying by absorption or fluorescence intensity. The extraction method involves alkaline hydrolysis, which results in the hydrolysis of fat, vitamins release from cells, hydrolysis of vitamins A and E esters to the free form.

We used a colorimetric method in order to quantify vitamin PP (niacin). The method is based on the release of bounded niacin forms by hydrolysis, purification of the hydrolyzate from substances that interfere with the process of quantification, quantitative preparation of glutaconic aldehyde and colorimetric determination of its mass fraction at 400-425 nm in comparison with a standard solution.

An amount of group B vitamins was determined by fluorimetric method. The essence of the method is to release bounded forms of thiamine, riboflavin by acid and enzymatic hydrolysis, chromatographic purification of the resulting hydrolyzate from the compounds interfering with fluorimetric determination, quantitatively transfer in alkaline medium of thiochrome, and riboflavin.

Mineral composition of tissues was examined at atomic absorption spectrophotometer (apparatus produced by Perkin Elmer, USA). The content of micro- and macro elements in meat was determined by the conventional method, according to GOST 26928-86.

## RESULTS AND DISCUSSION

According to our research protein, fat, moisture, and ash contents in the beef meat from healthy animals are respectively: 19.6, 14.65, 64.9, and 0.85. Beef meat affected with salmonellosis is inferior in quality - protein, fat, moisture, and ash contents are respectively: 19.57, 9.34, 69.93, and 1.16. In the beef meat from healthy animals vitamin A, E, PP, $B_1$ and $B_2$ contents were respectively 0.009, 0.6, 5.40, 0.10, and 0.20. Beef affected with salmonellosis was inferior in quality: vitamin A, E, PP, $B_1$ and $B_2$ contents were respectively 0.005, 0.48, 4.53, 0.07, and 0.16. Macronutrients and micronutrients contents in the meat of healthy animals were the following: potassium - 355, calcium - 10.2, magnesium - 22.0, sodium - 73, iron - 2900, zinc - 3240. Macronutrients and micronutrients contents from the beef meat of experimental group

of animals affected with salmonellosis were inferior in quality: potassium - 338, calcium - 9.3, magnesium - 19.2, sodium - 60, iron – 2617, zinc – 2936. Amino acid content in the meat of animals affected by salmonella was significantly lower as compared to those indicators of healthy animals.

**Table 1.** The results of studies of cattle meat from animals affected with salmonellosis

| Parameter name, units test methods | Beef meat from healthy animals | Beef meat from the animal affected with salmonellosis | Designation of ND for |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Nutritional value g/100g: | | | |
| Proteins | 19.6 | 19.57 | I.M.Skurihin, 1998. |
| | | | I.M.Skurihin, 1998. |
| Fats | 14.65 | 9.34 | I.M.Skurihin, 1984. |
| Moisture | 64.9 | 69.93 | I.M.Skurihin, 1984. |
| Ash | 0.85 | 1.16 | I.M.Skurihin, 1987. |
| Energy value, kcal/100g | 185 | 162 | |
| Vitamin content, mg/100g: | | | I.M.Skurihin, 1998. |
| A | 0.009 | 0.005 | I.M.Skurihin, 1998. |
| E | 0.6 | 0.48 | I.M.Skurihin, 1998. |
| PP | 5.4 | 4.53 | I.M.Skurihin, 1998. |
| B1 | 0.1 | 0.07 | I.M.Skurihin, 1998. |
| B2 | 0.2 | 0.16 | |
| Mineral content in 100g: | | | |
| Macronutrients, mg: | | | R No. 09/066-02 |
| K | 355 | 338 | R No. 09/066-02 |
| Ca | 10.2 | 9.3 | R No. 09/066-02 |
| Mg | 22 | 19.2 | |
| Trace elements, ug: | | | GOST 26928-86 |
| Fe | 2900 | 2617 | ST RK GOST R |
| Zn | 3240 | 2936 | 51301-2005 |
| Amino acid mg/100g: | | | I.M.Skurihin, 1998. |
| Essential amino acids including: | | | I.M.Skurihin, 1998. |
| Valine | 1100 | 1065 | I.M.Skurihin, 1998. |
| Isoleucine | 862 | 832 | I.M.Skurihin, 1998. |
| Leucine | 1657 | 1609 | I.M.Skurihin, 1998. |
| Lysine | 1672 | 1624 | I.M.Skurihin, 1998. |
| Methionine | 515 | 493 | I.M.Skurihin, 1998. |
| Threonine | 859 | 829 | I.M.Skurihin, 1998. |
| Tripofan | 228 | 213 | I.M.Skurihin, 1998. |
| Phenylalanine | 803 | 775 | I.M.Skurihin, 1998. |
| Nonessential amino acids including: | | | I.M.Skurihin, 1998. |
| Alanine | 1153 | 1138 | I.M.Skurihin, 1998. |
| Arginine | 1083 | 1069 | I.M.Skurihin, 1998. |
| Aspartic | 1904 | 1872 | I.M.Skurihin, 1998. |
| Histidine | 718 | 713 | I.M.Skurihin, 1998. |
| Glycine | 986 | 978 | I.M.Skurihin, 1998. |
| Glutamine | 3310 | 3246 | I.M.Skurihin, 1998. |
| Hydroxyproline | 350 | 353 | I.M.Skurihin, 1998. |
| Proline | 859 | 852 | I.M.Skurihin, 1998. |
| Serine | 882 | 861 | I.M.Skurihin, 1998. |
| Tirosine | 699 | 683 | |
| Cystine | 296 | 290 | |

Essential amino acids content in the meat of healthy animals was the following: valine – 1100, isoleucine - 862, leucine - 1675, lysine - 1672, methionine - 515, threonine - 859, tryptophan - 228, phenylalanine - 803. Essential amino acids content in the meat of animals from the experimental group affected with salmonellosis was inferior in quality: valine - 1065, isoleucine - 832, leucine - 1609, lysine – 1624, methionine - 493, threonine - 829, tryptophan - 213, phenylalanine – 775.

Content of nonessential amino acids in healthy animals was the following: alanine - 1153, arginine - 1083, aspartic acid - 1904, histidine - 718, glycine - 986, glutamic acid - 3310, hydroxyproline - 350, proline – 859, serine - 882, tyrosine - 699, cystine - 296. Content of nonessential amino acids in beef meat of animals affected with salmonellosis was the following: alanine - 1138, arginine - 1069, aspartic acid - 1872, histidine - 713, glycine - 978, glutamic acid - 3246, hydroxyproline - 353, proline – 852, serine - 861, tyrosine - 683, cystine - 290. The results obtained are shown in Table 1.

Thus, the results of the study show that the meat obtained from cattle affected with salmonellosis has a lower nutritional value.

After performing the research studies we have found that in the muscle tissue of animals affected with salmonellosis nutritional value, and content of vitamins, macronutrients and micronutrients, amino acids is reduced as compared with the control animals.

The obtained data have confirmed that affection of carcasses with salmonellosis considerably affects the quality of meat. This leads to a decrease in the content of proteins, fats, vitamins, and amino acids.

## CONCLUSION

We have found that the beef meat of animals affected with salmonellosis is inferior in quality to the beef meat of healthy animals. Due to this fact not only the meat is to be referred to the technical disposal (as specified in the laws and regulations of veterinary-sanitary inspection), but the internal organs should be disposed too. In this case, carcasses should be directed to industrial processing (production of boiled and boiled/ smoked sausages).

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