

## **EFFECT OF FEEDING ENTERO-ACTIVE ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF ADIPOSE TISSUE**

**E.G. TRACHUK**, Assistant of Professor

**V.P. KUCHERYAVY**, Doctor of Agricultural Sciences

*Vinnitsia National Agricultural University*

It has been found that introduction of preparation Entero-active in the diets of fattening pigs at the rate of 1.0; 1.5 and 2.0 g per pig daily is likely to effect the total content of moisture and fat in pig organism, but it assists improbable reduction of protein content in adipose tissue, reduction of the melting temperature in the back fat and omentum by 1.2 – 1.3 ° or 3.1 – 3.5%, and caused probable increase of iodine number by 0.4 g or 0.7%.

**Key words:** *probiotic, Entero-active, fat, fattening, productivity, pigs.*

The problem of food safety in Ukraine can be solved by the substantial increase of pork production, consumption of which is historically inherent in Ukrainians. Therefore, intensification of pork production is one of the priority areas of research for modern science [12]. The scientists have found that feed additives of microbiological synthesis increase growth rate and preservation of piglets [2, 6, 7]. But when using the latter, the influence of biologically active substances on lipids as structural components of organs and tissues and as depositors of metabolic energy in animals has been studied much less [1, 14, 15].

Deposition of meat and fat are interrelated. Fat improves flavor and it is closely connected with the tenderness and juiciness of meat. In addition, characteristics of pork fat are critical for production of sausages and canned food [17]. Fluctuation of these indicators depends on breeding, feeding, housing and age of animals. In terms of production decrease of fat deposition is associated with the reduced feed costs and simultaneously with the increase of stress sensitivity of animals. Amount of fat and its localization require differentiated system of evaluation [16].

Due to high requirements for product quality, the mechanisms that regulate the processes of fat deposits in the body of animals are to be studied. Important role in the regulation of biosynthetic processes belongs to forage factors, particularly feed additives [5].

**The aim** of the present paper is to examine the impact of a new feed additive Entero-active having probiotic effect on the quality of the adipose tissue of young pigs of large white breed.

**Methods of research.** Scientific research was conducted in four groups of young pigs of large white breed, selected on the basis of analogues, with 15 pigs in each group. The initial live weight of animals was 53.3 kg. The first group was a control one. Comparative period lasted for 15 days. For 93 days of the basic growing period the second group of pigs was supplied with Entero-active at the rate of 1.0 g, the third group – 1.5 g, the fourth group – 2.0 g per head daily (table 1).

*Table 1*

**Scheme of the experiment**

Groups	Number of animals, pigs	Feeding characteristics by the periods	
		comparative, 15 days	Basic, 93 days
1 (control)	15	BD*	BD
2	15	BD	BD + Entero-active, 1,0 g / pig daily
3	15	BD	BD + Entero-active, 1,5 g / pig daily
4	15	BD	BD + Entero-active, 2,0 g / pig daily

\*BD – basic diet

When the animals achieved slaughter condition – body weight 110-120 kg – control slaughter was conducted and sample tissues were selected from four pigs in each group. Samples to determine physical and chemical characteristics of the back fat located above the 9-11<sup>th</sup> thoracic vertebrae, abdominal fat and omentum were taken from the same parts of the carcass of all animals. Physical and chemical characteristics of adipose tissue were measured according to special guidelines [11]. Biometric processing of the digital material was conducted according to recommendations of N.A.

Plokhinsky [13].

**Results of research.** Feeding of preparation Entero-active to fattening young pigs at the rate of 0.5 - 2.0 g per pig daily increases average daily gains by 4.2-16.2% and reduces feed cost per 1 kg of weight gain by 4.0-13.9% [9]. This preparation has also facilitated reliable increase in slaughter weight by 12.8-14.3%, increase in slaughter output, on the average, by 5.2% [10]. This growth has been accompanied by better tenderness of meat and increase of content of unsaturated fatty acids.

Presence of fat tissue improves caloric value of pork making it tender, flavorful, but excessively high amount of fat in pork leads to a relative decrease in protein content and reduction of its nutritional value. Biological value of intramuscular and basting fat of pigs is caused by high content of the polyunsaturated essential fatty acids, particularly arachidonic acid, and deficient vitamins (A and E).

Feeding is the main factor that ensures the growth and development of the pig organism, adaptation to the environment, which ultimately affects chemical composition of tissues.

Reduction of energy level in the diet by 15-30%, compared with current standards, reduces fat output by 6-13%, thickness of the back fat by 3-12%, growth of the area of muscle cells by 6-13%, and specific carcass weight by 1-3%, increases iodine value of basting fat, indicating a shift towards higher content of fatty acids. Increase of the energy level by 15%, compared with the standard, increases fat output by 3% and reduces meat output by 2% [3].

For thorough characteristic of adipose tissue of young pigs it is necessary to determine total moisture, fat, protein, caloric value, refraction index, temperature of melting and iodine value.

The effect of the studied preparation on the quality of adipose tissue can be analyzed using data in table 2. According to the results of research, preparation had no probable impact on the total moisture and fat content in the samples. In contrast, there was observed uncertain reduction of protein content in the back fat and omentum in the second group. In all experimental groups calorific value was at the level of values of the control group.

Table 2

**Physical and chemical characteristics of adipose tissue of young pigs,  $M \pm m$ ,  $n=4$** 

Characteristic	1 group (control)	2 group	3 group	4 group
spinal				
Total moisture, %	6,7±0,97	6,1±0,78	5,9±0,55	5,8±0,95
Fat, %	91,7±0,95	92,6±1,1	92,5±0,85	92,7±0,85
Protein, %	1,6±0,11	1,3±0,15	1,6±0,19	1,5±0,21
Caloric value, kJoule	3585±44,1	3614±57,3	3721±61,7	3738±64,2
Refractive index	1,4561	1,4568	1,4584	1,4580
Temperature of melting, °	36,8±0,42	35,8±0,35	35,6±0,37	35,5±0,40
Iodine number, g	54,3±1,14	54,8±1,11	55,4±1,1	55,3±0,95
Abdominal				
Total moisture, %	4,3±0,75	4,1±0,95	3,8±0,75	4,2±0,93
Fat, %	94,1±0,93	94,1±0,77	94,5±0,95	94,0±0,82
Protein, %	1,6±0,16	1,8±0,21	1,7±0,18	1,8±0,31
Caloric value, kJoule	3841±23,5	3875±52,3	3922±33,7	3864±45,7
Refractive index	1,4581	1,4588	1,4591	1,4586
Temperature of melting, °	38,7±0,33	38,4±0,29	37,9±0,32	37,9±0,28
Iodine number, g	58,6±0,98	58,5±0,11	59,2±0,13	59,3±0,9
Omentum				
Total moisture, %	1,5±0,16	1,4±0,16	1,3±0,18	1,3±0,13
Fat, %	97,3±0,21	97,7±0,18	97,6±0,15	97,7±0,18
Protein, %	1,2±0,12	0,9±0,09	1,1±0,15	1,0±0,11
Caloric value, kJoule	3755±46,4	3855±61,5	3891±51,3	3861±35,8
Refractive index	1,4575	1,4578	1,4581	1,4579
Temperature of melting, °	38,4±0,42	38,1±0,35	37,5±0,27	37,2±0,37
Iodine number, g	56,3±0,11	56,6±0,90	56,7±0,12*	57,6±0,9

\* $P < 0,05$ 

Coefficient of refraction is a key parameter that characterizes fat and acid composition of fat. This index is based on the ability of fatty acids to refract light depending on their composition and structure. It is well-known that due to increase of molecular weight of saturated fatty acids coefficient of refraction grows. Coefficient of refraction of unsaturated fatty acids is much higher than that of saturated acids, with the same number of hydrocarbon atoms [8]. As the results of our research have shown,

application of Entero-active in the diets has caused insufficient growth of the coefficient of refraction in all the studied samples within 0.09%. Some authors have noted that the amount of fat refraction does not depend on the level of animal nutrition [3].

Chemically, fat of mammals is a mixture of esters and fatty acids (palmitic, stearic, oleic). The more oleic acid fat contains, the softer it becomes and the lower its temperature of melting is. When increasing content of stearic acid, fat becomes harder and increases its melting point. Pork fat melts at the temperature of 30-40 °C, and the lower the temperature of fat melting, the higher its absorption is [4]. Therefore, the amount of unsaturated fatty acids increases. According to conducted researches, the third and fourth groups tend to lower the melting point of the back fat and omentum by 1,2-1,3° or 3.1-3.5%, that may indicate an increase in commodity value of the investigated product when feeding probiotic preparation.

Iodine number is another parameter that characterizes quantitative content of unsaturated fatty acids in the adipose tissue. Various doses of the preparation have no proven negative effect on this index, but contribute to its improbable increase by 1.2 - 2.0% in vertebral and abdominal adipose tissue. The exception is omentum in the third group, where the animals received Entero-active at the rate of 1.5 g per pig daily and the growth of the iodine number by 0.4 g or 0,7% ( $P < 0,05$ ) was observed.

### **Conclusions**

1. Feeding of preparation Entero-active to fattening young pigs at the rate of 1.0, 1.5 and 2.0 g per pig daily is not likely to influence the overall content of moisture and fat, but it facilitates improbable reduction of protein content in adipose tissue.

2. Application of Entero-active in the diet facilitated the reduction of melting point in the back fat and omentum by 1.2 – 1.3 ° or 3.1 – 3.5%.

3. Entero-active applied at the rate of 1.5 g per pig daily causes probable increase in iodine number by 0.4 g or 0.7% ( $P < 0,05$ ).

## REFERENCES

1. Алиев А.А. Липидный обмен и продуктивность жвачных животных / А.А. Алиев. – М.: Колос, 1980. – 383 с.
2. Баканов В.Н. Кормление сельскохозяйственных животных / В.Н. Баканов, В.К. Менькин – М.: Агропромиздат, 1989. – 511 с.
3. Бірта Г.О. Товарознавство м'яса. Навчальний посібник / Г.О. Бірта, Ю.Г. Бургу – К.: Центр учбової літератури, 2011. – 164 с.
4. Бутко М.П. Ветеринарно-санитарная экспертиза мяса / М.П. Бутко, Н.И. Мазур – К.: ИПК Минпищепрома УССР, 1983. – 64 с.
5. Вуд Дж.Д. Депонирование жира и качество жировой ткани у мясных животных // Жиры в питании сельскохозяйственных животных / Дж.Д. Вуд – М.: Агропромиздат, 1987. – С. 311 – 339.
6. Герасименко М.А. Кормовые добавки для свиней / М.А. Герасименко, С.А. Мороз, Л.П. Ярошевич // Зоотехния. – 1990. – №1. – С. 52 – 53.
7. Калачнюк Г. Пробиотики в живленні тварин / Г. Калачнюк, М. Мароунек // Вісник аграрної науки. – 1992. – № 10. – С. 29 – 31.
8. Косенко І.М. Вплив кормових добавок на продуктивність та якість жиру молодняку свиней: автореф. дис. на здобуття наук. ступеня канд. с.-г. наук: спец. 06.02.02 «Годівля тварин і технологія кормів» / Ірина Миколаївна Косенко; Інститут тваринництва. – Харків, 2001. – 17 с.
9. Вплив згодовування препарату Ентеро-актив на відгодівельні показники молодняку свиней / [В.П. Кучерявий, Є.Г. Трачук, В.О. Пустовіт, А.А. Медвідь] // Біоресурси і природокористування. Науковий журнал. – 2012. – Т.4, № 5 – 6. – С. 85 – 89.
10. Кучерявий В.П. Забійні показники відгодівельного молодняку свиней за згодовування препарату Ентеро-актив / В.П. Кучерявий, Є.Г. Трачук, І.В. Кулик // Вісник аграрної науки. – 2012. – № 8. – С. 38 – 40.
11. Методические рекомендации по оценке мясной продуктивности качества мяса и подкожного жира свиней // ВАСХНИЛ. – М., 1987. – 60 с.

12. Пелих В.Г. Селекційні методи підвищення продуктивності свиней: монографія / В.Г. Пелих – Х.: Айлант, 2002. – 264 с.
13. Плохинский Н.А. Руководство по биометрии для зоотехников / Н.А. Плохинский. – М.: Колос, 1969. – 352 с.
14. Скорохид В.И. Исследование жирового обмена у крупного рогатого скота / В.И. Скорохид. – Львов, 1972. – 42 с.
15. Янович В. Обмен липидов у животных в онтогенезе / В. Янович, П. Лагодюк – М.: Агропромиздат, 1991. – 317 с.
16. Ender K. Fettansatz und fettqualität in Beziehung zur Qualitätsbewertung von Schlachtschwein / K. Ender, G. Kuhn // Tierzucht. – № 41. – P. 272 – 274.
17. Sommer W. Dem Fetteinsatz Grenzen ziehen / Sommer W. // Landw. Wochenbl. Westfalen–Lippe. – V.146. – P. 32 – 33.

## **Вплив згодовування Ентеро-активу на фізико-хімічні властивості жирової тканини**

*Трачук С.Г., Кучерявий В.П.*

Встановлено, що введення до раціону відгодівельного молодняку свиней препарату Ентеро-актив в дозах 1,0; 1,5 та 2,0 г на голову за добу не має вірогідного впливу на загальний вміст вологи та жиру в організмі тварин, але сприяє невірогідному зменшенню протеїну в жировій тканині, зниженню температури плавлення в хребтовому шпику та сальнику на 1,2 – 1,3° або 3,1 – 3,5 % та зумовлює вірогідне підвищення йодного числа на 0,4 г або 0,7 %

**Ключові слова:** *пробіотик, Ентеро-актив, жирова тканина, відгодівля, продуктивність, свині.*

## **Влияние скармливания Энтер-актива на физико-химические свойства жировой ткани**

*Трачук Е.Г., Кучерявый В.П.*

Установлено, что введение в рацион откормочного молодняка свиней препарата Энтер-актив в дозах 1,0, 1,5 и 2,0 г на голову в сутки не имеет достоверного влияния на общее содержание влаги и жира, но способствует невероятным уменьшению протеина в жировой ткани, снижению температуры плавления в позвоночном шпике и сальнике на 1,2 - 1,3 ° или 3,1 - 3,5% и обуславливает достоверное повышение йодного числа на 0,4 г или 0,7%.

**Ключевые слова:** *пробиотик, Энтер-актив, жировая ткань, откорм, производительность, свиньи.*