



Original Contribution

ESTABLISHING OF THE EFFECT OF DIFFERENT LEVELS OF TRITICALE IN COMPOUND FEED FOR GROWING PIGS

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ABSTRACT

Two scientific experiments with growing pigs, starting immediately after weaning were conducted in the Agricultural Institute - Shumen. The first experiment was carried out with three groups of 16, or a total of 48 pigs from the cross ♀ Danube White x (English Landrace x Pietrain) x ♂ Danish Landrace. The second experiment was set up with three groups of 12 pigs or a total of 36 pigs from the cross ♀ Danube White x ♂ (Danube White x Duroc).

The aim of the study was to determine the effect of different levels of triticale on productivity in formulas for growing pigs.

Triticale has a better amino acid composition and a lower crude fiber content than wheat. The substitution of 50% and 100% of wheat in the compound feed in protein equivalent with triticale does not affect the daily feed consumption, growth intensity and feed conversion per kg of gain in growing pigs from crossbred ♀ Danube White x (English Landrace x Pietrain) x ♂ Danish Landrace.

Triticale can successfully replace wheat in compound feed for growing pigs.

Key words: nutrition, alternative feed, average daily gain, swine

INTRODUCTION

Triticale is a hybrid between wheat and rye and has been used frequently in recent years for feed for farm animals, including pigs. In his research (1) found that triticale was superior to maize in protein, calcium, phosphorus, lysine, threonine, arginine, and glycine, but inferior in fat and fiber, cystine, valine, leucine, phenylalanine, histidine, and equalized in isoleucine. The authors found that triticale can successfully participate in mixtures for growing pigs, completely replacing maize in its participation in the ration of 50%.

Numerous studies indicate that triticale can successfully replace maize, wheat and barley in pig mixtures without having a negative effect on their productivity (2-6). In their studies (7), indicated that it is possible to include triticale up to 60% in pig mixtures without adversely affecting growth.

(8) found that the inclusion of triticale in compound feeds resulted in less accumulation of heavy metals in muscle tissue in fattening pigs.

(9) replaced part of the maize with triticale and found that in both suckling and fattened pigs, the replacement of more than 1/3 of the maize had an adverse effect on productivity.

The aim of the study was to determine the effect of different triticale levels on productivity in compound feeds for growing pigs.

MATERIAL AND METHODS

Two scientific experiments with growing pigs, starting immediately after weaning were conducted in the Agricultural Institute - Shumen. The first experiment was carried out with three groups of 16, or a total of 48 pigs from the cross ♀ Danube White x (English Landrace x Pietrain) x ♂ Danish Landrace. The second experiment was set up with three groups of 12 pigs or a total of 36 pigs from the cross ♀ Danube White x ♂ (Danube White x Duroc).

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The groups in both experiments were equalized by sex, origin and live weight. The experiments started as follows: the first at 7.3 lw and the second at 9.5kg. And they finished respectively at 30.00-32.714 kg and at 30.400-30.682 kg live weight.

The scheme of the experiment is presented in **Table 1**, and the content of nutrients in the feed in **Table 2**. Triticale replaces 50% of wheat in protein equivalent in pigs of experimental group II and 100% in those of group III.

Table 1. Experiment scheme

Indicators	Groups		
	I	II	III
Wheat,% in feed	27,00	13,50	-
Triticale,% in feed	-	15,05	30

Table 2. Nutrient contents in 1 kg compound feed

Indicators	Groups		
	I	II	III
Protein, g	177,1	177,1	177,2
Lysine, g	10,2	10,4	10,6
Ca, g	9,4	9,8	9,6
P,g	8,0	7,9	7,7

The pigs were fed *ad libitum* with dry flour mixtures, in groups of 8 animals in the first and 6 animals in the second experiment. They also received water *ad libitum*. The animals were kept in raised group boxes. During the experiment, the following traits were monitored: live weight, feed intake, feed conversion per 1 kg of gain and the health.

RESULT AND DISCUSSION

From the chemical analysis results of the feed (**Table 3**), it can be seen that triticale is inferior to wheat in some indicators. This is in line with research by other authors (10,11), who found a higher lysine content in triticale compared to

wheat and corn. The nutritional value of protein was determined by the content of essential amino acids.

According to the literature, there is a significant variation in the chemical composition of triticale as a result of a large number of hybrid varieties. The lysine content in grain protein varies in the range of 2.2 to 3.4%, in contrast to wheat 1.7 to 2.1% (12). In the studies of (13), the protein in the dry matter of the analyzed samples of triticale was in the range of 13.0-17.8%. (14) emphasized that different varieties of triticale contain 11 to 20% crude protein.

Table 3. Chemical composition of triticale and wheat, %

Components	Dry matter	Crude protein	Crude fats	Crude fibers	Nitrogen-free extract substances	Trace minerals
In initial damp						
Triticale	84,46	9,83	1,04	2,02	70,02	1,55
Wheat	81,44	10,96	1,11	2,70	64,85	1,82
In completely dry state						
Triticale		11,64	1,23	2,39	82,90	1,84
Wheat		13,46	1,36	3,32	79,63	2,23

From the determined results for the first experiment, presented in **Table 4**, it can be seen

that with regard to the average feed intake per day, protein and lysine was the same for all

three groups. This led us to believe that the triticale included in the mixtures under the adopted scheme did not affect feed consumption. Similar to our studies are those of (1), who also found no differences between the studied groups in terms of feed intake and protein and lysine intake.

Regarding the live weight and average daily gain traits, it can be seen that the animals of group III, which received a higher percentage of triticale in the mixture, had higher values for the respective traits, as the differences between the groups were small and statistically insignificant. The costs of compound feed and nutrients (protein and lysine) for the formation of kg gain were approximately the same in the individual groups.

The results of the second experiment carried out according to the same scheme and with the same batches of feed, are presented in **Table 4**.

The analysis of the data shows that the inclusion of triticale as a cereal component did not adversely affect both feed consumption and kg gain costs. The average daily gain was the same in the individual groups, which shows that triticale did not adversely affect the intensity of growth.

The effect of triticale levels on the feeding of growing pigs was studied by (15). The authors investigated the different levels of triticale in the mixtures for weaned pigs - 0, 20, 40, 60, 80 and 100%. According to the results, they concluded that the increased amount of triticale in the diet of weaned pigs, over 60% led to a decrease in growth, while feed consumption increased. (16), indicated the possibility of effective replacement of maize and barley with triticale in mixtures for pigs weighing between 25 and 100 kg.

Table 4. Live weight, average daily gain and feed conversion

Indicators	Groups		
	I Control	II 50% Triticale	III 100% Triticale
First experiment			
Feed intake per animal per day:			
Compound feed kg	0,861	0,819	0,861
Protein, g	152,48	145,04	152,57
Lysine, g	8,8	8,5	9,1
Average daily gain, g	0,398	0,363	0,407
S _x	0,024	0,026	0,024
C	23,43	26,80	21,73
Feed conversion for 1kg gain:			
Compound feed kg	2,163	2,256	2,116
Protein, g	383,07	399,54	374,96
Lysine, g	22,1	23,5	22,4
Second experiment			
Feed intake per animal per day:			
Compound feed kg	0,977	0,985	1,036
Protein, g	173,03	174,44	183,58
Lysine, g	9,9	10,2	11
Average daily gain, g	0,439	0,435	0,434
S _x	0,022	0,027	0,024
C	16,74	20,65	18,82
Feed conversion for 1kg gain:			
Compound feed kg	2,226	2,264	2,387
Protein, g	394,2	400,95	422,98
Lysine, g	22,7	23,5	25,3

The coefficients of determination (**Table 5**) are low for the individual traits except for the high values in gain and live weight at the end of the

experiment ($R^2 = 0.869$ in I experiment and $R^2 = 0.926$ in II), which is an indication that the test factor is not essential for productivity indicators.

Table 5. Coefficients of determination (R^2) and ANOVA F-test

Traits	Number	Group	SEX	W1	W2
First experiment					
	n=39				
\bar{x}		1.949	1.487	7.497	32.923
SD		0.857	0.506	1.068	5.223
R^2		0.017	0.065	0.043	0.869
Average daily gain, g		n.s	n.s	n.s	+++
Second experiment					
	n=34				
\bar{x}		2.029	1.529	9.527	30.485
SD		0.834	0.506	1.511	4.712
R^2		0.001	0.036	0.261	0.926
Average daily gain, g		n.s	n.s	++	+++

Significance of differences: ++ - $P \leq 0,01$, +++ - $P \leq 0,001$; n.s-no significance

Pig morbidity was reported only in the first experiment, where the percentage of digestive disorders was higher for the two experimental groups (2.53% in group II and 2.8% in group III, compared to 0.2% in the control group). However, the incidence rate was low and acceptable during the post-weaning period for pigs. No pigs were reported to have diseases during the second experiment. Weaning stress is usually associated with reduced food intake, stunted growth, and increased susceptibility to disease (17, 18). The mortality rate after weaning varied from 6-10%, and in some cases can reach up to 20%. Growing pigs, due to their poorly developed digestive system, are much more sensitive to the anti-nutrient substances contained in the feed, which can lead to indigestion (19). Trypsin inhibitors can lead to a decrease in nutritional value and protein conversion.

Their activity in triticale was higher than in wheat. In the conditions of our experiments we did not take into account health problems related to the inclusion of triticale as a cereal component in the compound feed for growing pigs.

The data obtained in our experiments indicates that triticale can successfully replace wheat in compound feed for growing pigs.

CONCLUSION

The substitution of 50% and 100% of the wheat in the compound feed for protein equivalent with triticale does not affect the daily feed consumption, intensity of growth and feed

conversion per kg of gain in growing pigs from crossbred ♀ Danube White x (English Landrace x Pietrain) x ♂ Danish Landrace.

Triticale can successfully replace wheat in compound feed for growing pigs.

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