

THE USE OF ACORNS AS AN ALTERNATIVE COMPONENT IN THE FEED MIXTURE FOR FATTENED PIGS

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Abstract

The use of acorns as feed component for pigs is an interesting alternative, a positive effect of these fruits on animal nutrition and, through the produced meat, on human nutrition can be used. The inclusion of acorns is also an option to reduce feed costs and the possibility of using local raw material produced in natural way. Therefore, we designed a feed mixture with the addition of dried shredded acorns, which can be fed to pigs kept in a stable. The proposed mixture was practically verified in a feeding experiment. We used 20 pigs of the Prestice black-pied breed divided to 2 groups, the control group (C) was fed the basic mixture used for fattening this breed. The experimental group (A) was fed the proposed mixture containing 10 % dried shredded acorns, it was balanced on the same nutrition level as control group. The experiment started at an average body weight 74 kg up to 117 kg. The acorn feed mixture was well tolerated by pigs, no negative effect on health was found, differences in performance between the groups were not statistically significant. We concluded that the breed Prestice Black-Pied can be fattened a feed mixture containing acorns at the level of 10% in intensive conditions, without significantly changing the parameters of fattening.

Key words: Acorns, feed mixture, fattening, pig

In the past, pig breeding took place in the form of grazing in forests, later on pastures designated for this purpose. An extensive farming, including pig grazing, has been partially maintained, especially in the Iberian Peninsula and the Mediterranean, and it is returning to other areas in the form of alternative and organic farms. This is not only due to efforts to raise animals in natural conditions and respect welfare, but also in connection with the increasing demand for meat produced naturally or in organic quality. It is used to produce specific, very popular products from pigs fattened with acorns. The acorn feed ration affects the physical properties of the meat, organoleptic properties and sensory properties. The nutritional properties also change, as the ratio of fatty acids in lard and pig meat changes. The proportion of fatty acids changes significantly, in particular the proportion of oleic acid increases in the direction favorable to

human nutrition from the cardiovascular point of view (Fallola, 1998). Petron et al. (2004) found more oleic acid and less stearic and palmitic acids in acorn-fed Iberian pig meat. The resulting product is healthier for consumers due to the high content of omega-3 fatty acids and oleic acid, which has, among other things, a positive effect on cholesterol levels.

In the Czech Republic, the tradition of grazing was not preserved as in the states of southern Europe, but about sixty years ago grazing was a common phenomenon here. At present, with the increase in the number of alternative and organic farms in our country, the use of grazing and outdoor methods of pig farming has been partially renewed. However, high concentrations of animals and modern genotypes highly demanding on environmental conditions do not allow their greater application, grazing of pigs in forests in the current zooveterinary

situation is not possible at all. On the other hand, there is an increasing demand for meat with high nutritional value, in organic quality, or with a targeted content of some nutrients. From this point of view, feeding acorns to pigs is a very interesting alternative, which allows to influence the quality and composition of the produced meat in a positive way. Therefore, we designed a mixture with the addition of dried shredded acorns, which can be fed to pigs kept in a stable. Thus, the positive effect of these fruits on animal nutrition and, through the produced meat, on human nutrition can be used. The inclusion of acorns is also an option to reduce feed costs and the possibility of using local raw materials produced in natural way.

Material and Methods

The aim of the experiment was to create a feed mixture containing acorns and verify its use for fattened pigs. We used fallen acorns from English oaks (*Quercus robur*) and northern red oaks (*Quercus rubra*). Dried, unpeeled acorns were analyzed according to standard methodology. Fatty acid composition was determined after chloroform-methanol extraction of total lipids and alkaline trans-methylation of fatty acids. Gas chromatography of methyl esters was carried out using a Hewlett Packard 5890 Series II chromatograph, evaluation according to standard FAME Mix (37 Component) Supelco.

The proposed mixture containing acorns was balanced by the program Optimization of feed mixtures for pigs (Agrokonzulta Žamberk) to the level of nutrients contained in the feed mixture commonly used for fattening pigs of this breed.

The proposed mixture was practically verified in a feeding experiment. We used 20 pigs of the Prestice black-pied breed, which is suitable for testing alternative components due to its low demands and adaptability on environmental conditions. The pigs were divided into two groups of 10 with a balanced sex ratio.

The control group (C) was fed the basic mixture used for fattening this breed. The experimental group (A) was fed the acorn mixture containing 10 % dried shredded acorns. The animals were fed ad libitum and housed in the stall in the group pens with the full concrete flooring and bedding. The experiment was started at an average pig weight of 74 kg. Animals were weighed at weekly intervals and feed consumption was recorded at the same time. The pigs were slaughtered at an average weight of 117 kg.

The experimental data were statistically processed by Microsoft Excel.

Results and Discussion

The nutrient composition of acorns determined by analysis is shown in Tab.1

Analysis of fatty acids in acorns is given in Tab.2. A total of 35 fatty acids were determined, the table shows some of the most important saturated acids (SFA) and the most important representatives of unsaturated acids, as well as the total value of SFA, MUFA, PUFA. The analysis confirmed a relatively high proportion of PUFAs as well as unsaturated fatty acids oleic and linoleic, which have a positive effect on the composition of meat and fat in pigs and thus on human health.

Based on the analyzes, a feed mixture containing 10% of dried shredded acorns was designed. The proposed mixture is composed of common components used in commercial mixtures for fattened pigs.

Composition of the mixture:

- wheat 45%
- barley 28%
- rapeseed extracted shredded meal 12%
- dried acorns 10%
- wheat bran 2%
- supplement of amino acids, vitamins and minerals 3%

The nutrient composition of the mixtures is given in Tab.3.

Pigs fed a mixture with the addition of acorns achieved an average daily gain of 0.828 kg, control group of 0.900 kg over the whole period of experiment. It was not statistically significant difference. The growth of the pigs during the experiment is shown in graph 1. A feed consumption was 3.25 kg / day for group A and 3.4 kg for C group, which corresponded to an average feed conversion of 3.97 and 3.76. These differences were not statistically significant and we can conclude that feeding mixture with acorns didn't affect the parameters of fattening in these conditions.

The overall assessment of the mixture effect should consider the native breed, which does not have as high a level of performance as a

modern pig genotypes, but brings the ability to adapt to alternative, not so highly concentrated feed. However, comparison with other native breeds is difficult due to the different performance and overall characteristics of the breeds and especially because native breeds fattening by acorns take place in outdoor farming in extensive conditions. There are a number of publications on the use of acorns in fattening pigs, mostly from Spain and Italy (Almeida et al., 2018; Pugliese et al., 2009; Garcia-Valverde, R; Nieto, R; Aguilera, JF, 2010), but it is always in a free-range condition where pigs are kept outside and have free access to acorns. Our experiment took place in intense conditions and proved that it is possible to use acorns even with this method of fattening.

Table 1. Nutrient composition of acorns

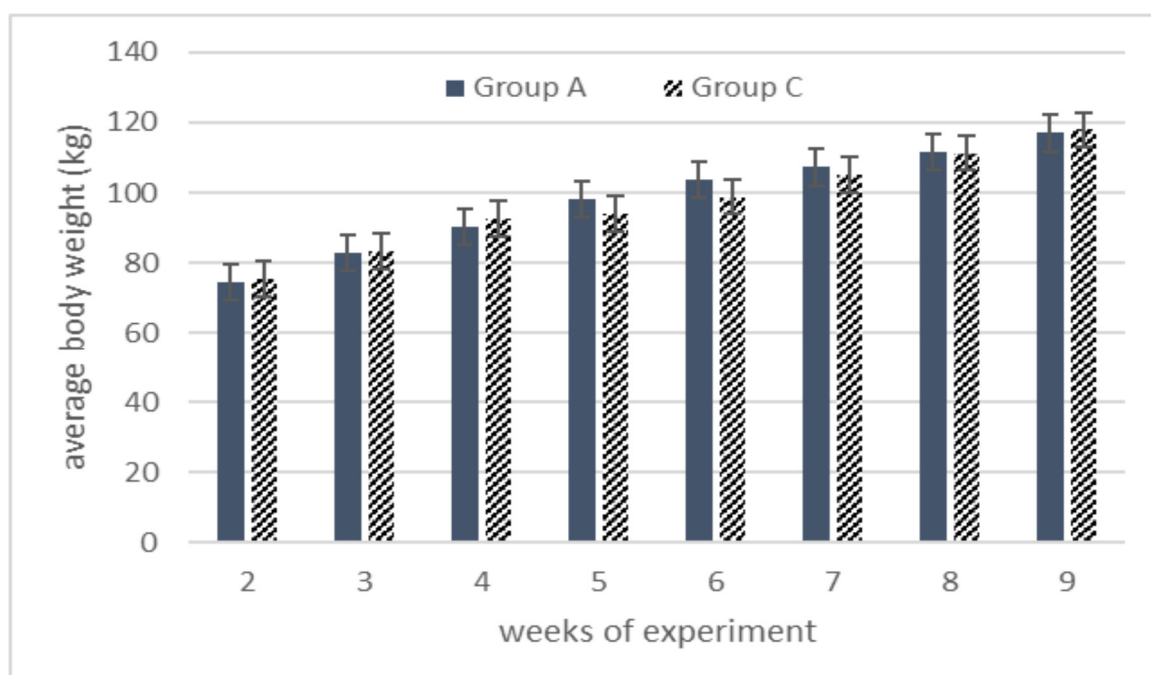
Dry matter	%	90,763
Nitrogen	%	0,763
Crude protein	%	4,767
Ash	%	2,003
Sucrose	%	0,000
Starch	%	35,306
Fat	%	4,069
Fiber	%	9,818

Table 2. The summary results of the analysis of fatty acids in acorns (rel.%)

Fatty acid		Average value
Myristic	C14:0	0,24
Palmitic	C16:0	14,56
Stearic	C18:0	3,43
Oleic	C18:1n9	38,42
Linoleic	C18:2n6	32,21
alfa-Linolenic	C18:3n3	2,34
Arachidonic	C20:4n6	0,15
SFA		21,36
MUFA		41,40
PUFA		37,21

Table 3. Nutrient composition of feed mixtures

%	Control mixture	Acorn mixture
Dry matter	87,705	87,849
Crude protein	14,886	14,206
Fat	4,023	3,849
Fiber	5,935	5,495
Ash	5,359	4,946

Graph 1. Average body weight of pigs (kg)

Conclusion

The formulated feed mixture containing 10% of the alternative component in the form of dried acorns was well tolerated by pigs, no negative effect on health or performance was found. It can be concluded that the breed Prestice Black-Pied can be fattened a feed mixture containing acorns at the level of 10% in intensive conditions, without significantly changing the parameters of fattening. The influence of nutrients contained in acorns on the composition of meat and fat in pigs fattened in this way is the subject of further ongoing research.

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