

WASTE FROM AGRICULTURAL PRODUCTION OF ENERGETIC CROPS AND ITS UTILIZATION

OTPAD U POLJOPRIVREDNOJ PROIZVODNJI ENERGETSKIH USJEVA I NJEGOVO ISKORIŠTAVANJE

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SUMMARY

Increasing part of the agricultural production is utilised in the production of energetic raw materials (in our conditions mainly biodiesel from rapeseed and bioethanol from cereals). Huge leftover is generated in the process, still keeping part of the feeding value, so it is possible to use this material for production of feeding mixtures. To validate its suitability and proper dosage, experiments on swine, poultry and broilers were carried out.

The usage of waste raw materials of plant origin in feedstuff mixtures for cattle has got the tradition and logical justification, mainly if:

- This way of waste usage is also its acknowledgement
- The valuable components are, by usage of waste materials, put into the complete feedstuff and at the same time, the undesirable substances are avoided.
- It is proven by nourishment trials that usage of raw materials does not effect depressive by the growth and efficiency of animals fed on them.
- The safety of animal products (meat, milk, eggs) is not jeopardized and, the welfare of animals is not decreased
- The cost of the waste usage is lower than the price of raw material to be replaced.

Relevance to this topic is given by the growing representation of agriculturally cultivated plants intended for the production of technical and energetic raw materials. The large amount of bulky

waste which can fulfil other nourishment functions arises from the raw material energy.

In practise, it is related to subsequent biotechnology and originating waste:

- Milling industry, sugar industry, the production of starch and alcohol – waste originating from production of flour and processed crops, beet places, starch and alcohol waste – saflor
- Alcohol pressed pieces arise from the production of etylalcohol for food and energy usage (cereals, mainly winter wheat, maize).

In the frame of testing activities of the Central Institute for Supervising and Testing in Agriculture the production efficiency of complex feedstuff mixtures subsidized by subsequent waste raw materials originating from non-food plant production were evaluated from 1995 to 2009:

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- Substitute of rape extracted groats by rape pressed pieces from the production of bio diesel – nourishment trial with swines
- Classifying oil cakes from moulding oil of *Carthamus tinctorius* (saflor) into complex feedstuff mixtures for breeding of laying hens.
- Classifying alcohol molasses from the production of ethyl-alcohol for energy purposes into feedstuff mixtures for the feeding of swines and broilers (trial with swines performed as a feeding as well as a balance trial).

Summary of trial methodology

The nourishment trials were performed as of standard feeding trials with the use of optimized complex feedstuff mixture (control variation of trial) and complex feedstuff materials with a graded dose of tested waste raw material; the gradation was chosen in the amount 5, 10 to 15 % of tested raw material.

In all trial variations the health state as well as the coefficient amount of production of experimental animals was checked continuously **according to Brüggemanna** catering the daily average growth of animal weight as well as the consumption of tested feedstuff per one kilogram of weight growth.

The quality of meat product of the slaughtered animals was monitored after finishing the feeding. The laying and quality of eggs of laying hens were monitored.

DISCUSSION OF SUMMARIES FROM INDIVIDUAL TRIALS

1. Substitution of rape oil extracted groats for oil rape pressed pieces (pig feeding):

The feeding trial has proven the limitation of the substitution of extracted rape oil groats for rape oil pressed piece. In all pig mass categories there was significant decrease of feedstuff intake as well as decrease of average daily growth of live weight. Production efficiency of feedstuff mixture declined by 3.1 to 4.5 %. It is possible to include pressed pieces into feedstuff mixture up to 3 % dose concerning financial compensation of loss caused by lower price of rape oil pressed pieces.

2. The evaluation of production efficiency of complete feedstuff mixture with 5 % of oil cake of *Carthamus tinctorius* (saflor) for breeding of laying hens.

Biological testing has proven the possibility of using oil cake of *Carthamus tinctorius* (saflor) in proposed amount up to 5 % without negative impact on production economy. The increase of egg production, shell firmness and higher colouring of egg yolk and on the other hand also the decrease of internal egg quality has not been statistically conclusive.

3. The evaluation of production efficiency of complete feedstuff mixture with the classification of alcohol molasses for feeding of broilers:

Biological testing has not proven unambiguous result. While lower doses of dried alcohol molasses (up to 6 % in feedstuff mixture) showed statistically significant increase of broilers live weight, increase of the content in feedstuff mixture reacted negatively to feedstuff conversion and caused growth depression.

4. The evaluation of production efficiency of complete feedstuff mixture with the classification of alcohol molasses for feeding of swines:

It was found by biological tests in swines fed from 30 to 100 kg of live weight that in tests conditions statistically significant influence of live weight increase or feedstuff conversion did not occur. According to coefficients of productive efficiency (see Brügemann) it can be recommended that the most suitable level of alcohol molasses is up to 10% of feedstuff mixture. The health state of swines as well as the slaughtering quality of meat was not influenced. In the conditions of balance trial, there arose the exudation of nitrogenous matters with the higher dosage of pot ale than in the control variation. The effect can be explained as a reaction to stress conditions of balance trial with the limitation of movement and social behaviour of swines.

CONCLUSION

Generally it can be said that the conditions by which the usage of waste plant raw materials in

complex feeding does not cause the growth of depression or the decrease of production coefficient of feedstuff value or the quality decrease of animal production can be set by biological nutritional trial at the best.

The important parameter for future usage of these raw materials remains mainly the efficiency of its usage. Nowadays, taking into account the position of world agriculture in general and mainly the agriculture of the EC members where there is a notable decrease of number of livestock together with high overproduction of crops, it is very difficult to set the economically acceptable conditions for the

substitution of these components of complete feedstuff mixtures by waste raw materials originating from industrial and energy plant processes. It is accepted without exception that these raw materials are impoverished in energetic components (fat, saccharide) which additionally restricts the extent of their usage.

On assumption that the production of bio-ethanol and bio-diesel will grow it is not possible to think about wide usage of molasses and pressed piece for feeding and for production of feedstuff and it is necessary to allow other means of their disposal, e.g. by composting or by combustion.

SAŽETAK

Sve veći se dio poljoprivredne proizvodnje iskorištava u proizvodnji energetskih sirovina (u našim uvjetima uglavnom biodizel iz uljne repice i bioetanol iz žitarica). Ogromni ostaci nastaju u tom procesu koji su zadržali dio hranidbene vrijednosti pa ih je moguće iskoristiti za proizvodnju krmnih smjesa. Da bi se procijenila upotrebljivost i odgovarajuće doziranje tog materijala provedeni su pokusi na svinjama, peradi i brojlerima.