

NUTRITIVE VALUE OF AGRICULTURAL BY-PRODUCTS IN RABBIT

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Introduction

The rabbit by its particular digestion equipment - by way of ceacotrophy - is able to utilize feeds of poorer nutritive matter, of richer crude fibre. Numerous by-product originates from food industry processing in the agricultural production, which can be taken into account in rabbit feeding. The by-products tested in our study can be classified into two big groups. The poor in nutritive matter and rich in fibre /wheat straw, corn-cob, corn stalk, sunflower hull, bean straw/ belong to one group. The components of the other group /wheat bran, dried beetroot slice, potato murc, apple murc, broiler litter/ beside their high fibre content they also possess a considerable nutritive value. The aim of our study was represented by the determination of the chemical composition, digestibility and nutritive value of the above-mentioned by-product.

Methods and materials

The protein, fat, fibre content and fibre fraction of the tested by-products in the experiment were carried out respectively by the method of Kjeldahl, Soxhlet, Weendei and Van-Sost. The amino acid composition of the by-products rich in protein was determined with amino acid analyzer. The utilization experiments we set in with 4 New Zealand White female matured rabbits per treatment by way of associated utilization, with total collection method.

The animals of each treatment consumed basic feed of identical composition in a fore-period of 7 days, then in a main period of 2x4 days. Subsequently the tested by-product was blended in the basic feed in 40 %, what was fed also after a 7 day fore-feeding for 2x4 days /COLIN,LEBAS,1976/. The digestibility coefficient of the by-product in question was calculated on the basis of the formula of SCHÜRCH /1969/. In possession of the chemical composition and the digestibility coefficients, the digestible energy of the individual by-products was evaluated on basis of the relationship worked out by JENTSCH et al. /1969/.

Results of the study

The chemical composition, ADF, cellulase and lignin content of the by-products tested in the study is summed up in table 1.

The amino acid composition of the by-products rich in protein are acquainted in table 2. The digestibility coefficient, digestible energy and crude protein content of the tested substances is included in table 3.

Evaluation of the results, conclusions

In our study the fibre by-products containing much fibre - as it was expected by the publication of SPREADBURY /1975/ - was very poorly digested. The wheat straw, corn-cob and the sunflower hull are extraordinarily poor in nutritive matter, containing much crude fibre, significant part of which is constituted by lignin that does not digest easily. The undigestible fibre by its cell-wall effect prevents the gastric juices to get in the plasm /FRKETE,L.1969/ its

distribution increases the progression speed of the guts content /LEBAS and LAPLACE,1977/ so declines to a great extent the digestibility of their further poor nutritive matter content. The digestibility coefficient of their fibre content remains under 20 % in each case. Their protein content is digested not even at 50 %. In rabbit nutrition the above by-products can be taken into account exclusively as fibre carriers, their nutritive effect is negligible.

There is less hardly digestible lignin in the fibre of the corn-stalk and bean straw than in the cereals straws, so rabbits digest their fibre content middling. Their content of modest protein and nitrogen-free extracts is digested better than the average. Their utilization is justified /in size of 2-4 mm/ on behalf of the maintenance of the ballast effect, the required bowels motility, but on the basis of their nutritive value they can contribute in a small degree to the energy supply of the rabbits.

The fibre of dried beetroot slice contains little lignin, the digestibility of its fibre in accordance with the results of FRANK and SEROUX /1980/, as well as NÓGRÁDI /1983/ was found very good. The digestibility coefficient of the fibre exceeds even the 50 %. Since the digestibility of the N-free extract content is also above 80 %, so the beetroot slice has great, 11.6 MJ/kg digestible energy content. For the rabbit it can primarily be taken into consideration as energy carrier feed. Its dietary effect is good, its ability to fix acids is minimal at its digestion by what promotes the desired low pH value in the stomach /PROHÁSZKA,1983/. The tomato murc is a food industrial by-product, rich in protein, energy and crude fibre. Its amino acid composition is also favourable, it contains more essential amino acids for the rabbit than the alfalfa meal of good quality.

The rabbit digests excellently its protein, fat and carbohydrate content, its digestibility of fibre can be judged as worse than middling.

In rabbit nutrition on the basis of its chemical composition and digestibility it can be respected as a source of protein, energy and fibre. A major part of its fibre is formed by hardly digestible lignin, so it is able to satisfy the important role of the fibre played in the digestion of the rabbit.

The comparatively high protein and crude fibre content of the broiler litter of poultry stable origin is digested moderately, the content of fat and N-free extracts is digested better than average.

A part of its fibre - since it contains straw, respectively sunflower hull - hardly digestible so this by-product can count as protein and fibre carrier in the rabbit nutrition. Its amino acid composition is also satisfactory, it contains the limiting amino acids for rabbit in almost identical proportion to alfalfa meal.

The rabbit digests the protein, fat, N-free extracts content of the wheat bran very well its fibre moderately. In rabbit nutrition as energy-, protein- and fibre-carrier feed can be applied. Its fine fibre fixes much water, it has laxative effect by its expanding ability.

The protein content of the apple murc is low, its fat and fibre content is relatively high. On the basis of its amino acid composition it is qualified as a worse protein value feed than the average, poor in methionine and cystine, its lysine content is not negligible on return. The rabbit digests its protein content moderately, its fat and N-free extracts better than the average, its fibre worse than the average. More than 1/3 of its fibre is constituted by difficultly digestible lignin.

It can primarily count as fibre source in the rabbit nutrition, but its digestible protein, fat and carbohydrate content can slightly contribute to the protein, respectively energy supply of the rabbit.

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Chemical composition of tested by-products in percent

By-product	Chemical composition									
	Dry matter	Crude ash	Organic matter	Crude protein	Crude fibre	Crude fat	N.F.E.	A.D.F.	Cellulose	Lignin
Wheat straw	88,8	8,9	79,9	2,9	41,5	2,5	33,0	69,9	51,0	18,9
Corn stalk	86,1	5,5	80,6	5,4	29,2	1,3	44,7	32,8	25,9	6,9
Corn cob	91,5	6,7	84,8	3,7	32,8	0,5	47,8	46,4	29,6	16,8
Sunflower hull	93,1	11,2	81,9	4,6	52,1	2,3	22,9	60,3	40,9	29,4
Wheat bran	88,0	6,4	81,6	14,7	11,1	4,3	51,5	14,9	13,7	1,2
Bean straw	91,2	7,6	83,6	8,7	30,9	1,5	42,5	33,2	27,0	6,2
Dried rutabaga slice	91,2	5,6	85,6	5,4	16,3	0,6	63,3	26,1	24,9	1,1
Tomato stalk	95,8	3,5	92,3	19,4	24,8	10,6	37,6	29,7	19,9	9,8
Strawy broiler litter	91,6	14,5	77,1	23,1	11,7	3,0	39,3	16,5	13,4	3,1
Apple marc	89,1	6,7	82,4	8,3	19,7	5,3	49,1	27,4	16,1	11,3

2. table

Comperison of amino acid composition of the
tested by-products rich in protein with that of the alfalfa meal
 Amino acid content is in percent of dry matter

Amino acids	Tested feedstuffs			
	Alfalfa meal	Tomato seed-skin	Apple murc	Broiler deep litter
arginine	0,94	2,25	0,22	1,12
cystine	0,38	0,39	0,12	0,32
phenylalanine	0,99	1,14	0,23	0,97
glycine	1,01	1,04	0,25	3,85
histidine	0,42	0,77	0,26	0,52
isoleucine	0,92	0,79	0,31	1,07
leucine	1,18	1,39	0,38	1,44
lysine	0,95	1,56	0,41	0,97
methionine	0,36	0,44	0,17	0,33
tyrosine	0,82	1,07	0,22	0,78
threonine	0,66	0,64	0,26	0,83
valine	0,89	0,86	0,35	1,14
crude protein %	18,8	19,5	8,3	24,3

3. table

Digestibility coefficient and nutritive value of the tested by-products

By-product	Dry matter	Crude ash	Organic matter	Crude protein	Crude fibre	Crude fat	N.F.E.	Strach value	Digestible energy	Digestible crude protein
Wheat straw	33,4	20,1	23,8	46,3	18,4	67,2	57,2	69	5,7	13,4
Corn stalk	49,2	35,1	60,5	68,5	24,8	84,2	67,6	261	7,8	37,0
Corn cob	48,0	40,2	58,8	51,3	18,3	83,1	65,2	207	7,1	19,1
Sunflower hull	26,8	57,6	32,2	47,7	17,1	83,2	40,7	63	4,5	21,9
Wheat bran	70,7	46,8	72,1	78,2	28,3	88,7	73,2	542	11,2	115,0
Bean straw	66,6	53,7	67,7	69,5	34,7	84,9	77,2	337	9,6	54,6
Dried butroot slice	74,1	58,7	75,3	66,8	50,3	77,4	83,1	556	11,7	36,1
Tomato stalk	70,5	53,4	73,8	73,3	26,3	87,3	86,9	559	13,7	142,2
Strawy broiler litter	65,9	49,3	68,2	68,4	44,9	86,2	71,4	481	10,4	150,0
Apple marc	72,9	56,3	73,8	66,6	28,7	83,3	81,9	481	10,9	55,3

NUTRITIVE VALUE OF AGRICULTURAL BY- PRODUCTS
IN THE BABBIT

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The authors determined the chemical composition, cellulose and lignin content, digestibility and nutritive value of 10 fibrous agricultural by-products in the rabbit. The wheat straw, corn-cob, sunflower hull are poor in nutritive matter and rich in fibre, a major part of what is formed by lignin. The rabbit digests their modest nutritive matter content slightly. The fibre of bean straw, and corn-stalk contains less lignin, their digestibility is more favourable than that of the wheat-straw. The rabbit is able to utilize suitably the nutritive matter content of the rest tested by-products. The rabbits digest excellently the carbohydrate content of the beet root-slice, the protein and fat content of the tomato marc and wheat bran, and digest moderately the nutritive matter content of the broiler litter and apple marc.

NAHRWERT DER LANDWIRTSCHAFTLICHEN NEBENPRODUKTE BEI DEN
KANINCHEN

Die Verfasser bestimmten die chemische Zusammensetzung von 10-artigen faserigen landwirtschaftlichen Nebenprodukten, ihren Zellulose- und Ligningehalt sowie ihre Verdaulichkeit und ihren Nährwert bei den Kaninchen. Weizenstroh, Maisstengel, Sonnenblumenschalen sind an Nährstoffen arm, aber in Fasern reich, deren bedeutendsten Teil Lignin bildet. Ihr bescheidener Nährstoffgehalt wird von Kaninchen spärlich verdaut. Die Fasern von Bohnenstroh und Maisstengel enthält wenigeres Lignin und ihre Verdaulichkeit ist günstiger als die von Weizenstroh. Die Nährstoffgehalte von anderen geprüften Nebenprodukten können die Kaninchen entsprechend nutzbar machen. Die Kaninchen verdauen den Gehalt des Kohlenhydrats von Rübenschnitteln, den Eiweiß- und Fettgehalt des Tomatentresters und der Weizenkleie ausgezeichnet, während den Nährstoffgehalt der Broilerstreu und des Apfelrestens mittelmäßig.

