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*Effect of Saponins on the Intake of Water and Feeds by Broiler  
Chickens and as Their Body Weight Gains*

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Wpływ saponin na zużycie wody i paszy przez kurczęta brojlery oraz na ich przyrosty masy ciała

Chickens show increased demand for water owing to much more intensive metabolism, especially concerning protein. According to C e n a (1977), limiting the access to drinking water results in decreased feeds consumption and a significant drop in body weight gains in the birds as well as the change in hematological indexes, expressed by the drop in the erythrocyte count. A b d e l s a m i e and Y a d i v i l o (1981), limiting the access to water for the broilers, found out a negative effect on body weight gains.

The amount of the water absorbed by the birds depends on various external factors, much influence on the amount of the water drunk is exerted by the temperature of the surroundings. P o d g ó r s k i (1998), B e l a y and T e e t e r (1993) claimed that the increase in the temperature of the environment resulted in a significant increase in the water consumption by the broilers. Water uptake is also dependent on the quality of the consumed fodder. The broilers fed with granulated mixture generally use more water than the ones receiving loose feeds, which is shown by B ą c z k o w s k a and Ś l ó s a r z (1980). There exists a correlation between the quantity of the consumed water and fodder. The birds drink, on the average, 2-2.5 l water/kg fodder. The birds which drink more water at the same time eat more feeds. The supplement of salt significantly increases the demand for water. It is also connected with the consumption of more feeds, which, in consequence, may lead to the increase in body weight gains. B e l a y



and Teeter (1993), Teeter et al. (1985), Smith and Teeter (1987) observed the increase in broiler body weight gains after they drank water with KCl supplement.

A similar effect on the increase in fodder consumption may be exerted by the supply of water, as shown by Goodall and Matsushima (1978), Hale and others (1961), Johnston and others (1981). Having considered the hitherto existing reports, an experiment was conducted in which a saponin Micro-Aid preparation, the *Yucca schidigera* extract was given to the birds instead of salt. The objective of the experiment was to determine the influence of the increased quantity of the preparation supplement on the water and feeds consumption by the birds and the rate of their growth.

#### MATERIAL AND METHODS

The studies were carried out on Vedetta broiler chickens, which were housed in cage sets, 50x80x40cm, between 21 and 56 days after birth. In the course of the experiment, 6 birds were placed in every cage. During the experiment, microclimatic conditions were controlled by automatic controlling of the air-conditioning system.

The parameters of the microclimate of the experimental room are presented in table 1.

Table 1. Microclimate of the broilers' quarters

	<i>X</i>	<i>SD</i>	<i>V</i>	min.	max.
Temp. (°C)	21.3	1.2	5.2	19.0	23.4
f %	54.7	6.9	12.6	45.0	66.0
e (mb)	5.3	0.59	11.2	5.4	11.5
H (mW/cm <sup>2</sup> )	22.4	2.09	9.9	4.1	6.2

Table 2. Feeds composition in %

Postextractive soybean meal	35.00
Ground maize	53.00
Fish flour	5.00
Soybean oil	3.00
Chalk fodder	1.40
Phosphate fodder	1.30
Salt fodder	0.30
Polfamix DKA	1.00
Micro-Aid (mg/kg)	120
Total protein	23.90
Metabolic energy (MJ/kg)	12.35



Laboratory conditions limited the number of the birds in experimental groups. Therefore, the variability resulting from the differences in sex had to be eliminated. This was attained by carrying out the experiment on 60 cocks divided into two groups of identical numbers of the birds. The broilers were fed at will with corn-soybean mixture, the composition of which is presented in table 2.

The control group was watered with no supplements. The experimental group was given an addition of liquid Micro-Aid at 5ml/10 l of water. The content of the saponin extract in the *Yucca schidigera* preparation was 30%. The Micro-Aid preparation started to be given after the 3<sup>rd</sup> week of life, i. e. from 21<sup>st</sup> to 56<sup>th</sup> days. The chickens were individually weighed every 7 days. However, the use of water and fodder was registered daily for all experimental groups.

## RESULTS AND DISCUSSION

The use of water by the animals is of significant dietetic value. Although it is not a nutrient, its supply influences the assimilation of nutrient substances, depending on the kind of feeds, microclimatic conditions. Its consumption undergoes differentiation.

In the livestock quarters, the content of harmful gases ( $\text{NH}_3$ ,  $\text{H}_2\text{S}$ ) is frequently distressing only because of the odour, but it also affects negatively the healthiness by lowering the resistance of birds and makes the animals more sensitive to pathogenic microbes.

One of the elements of the hygiene of the breeding habitation is limiting negative odours by supplementing the feeds and water with the vegetable compounds, the *Yucca schidigera* extract among others, which decreases the excretion of intestine gases as well as their secretion as the result of urea disintegration.

The results clearly show that the birds consumed more water and the gains in body weight were higher comparing with the control group (Tab. 3).

On the 22<sup>nd</sup> day of the birds' life, a marked increase in water consumption was noted in the group receiving the extract of *Yucca schidigera* in water.

Table 3. Gains of broiler body weight at differentiated water intake

t	Control group					Experimental group					P
	X	SD	V	dW	C	X	SD	V	dW	C	
21	657	41	6.3	315	1.41	632	43	6.8	292	1.37	NS
28	1022	100	9.8	365	1.65	1102	65	5.9	470	1.46	*
35	1397	159	11.4	245	1.80	1489	138	9.3	387	1.83	*
42	1671	177	10.6	274	2.20	1792	206	11.5	303	2.15	**
49	1973	250	12.7	302	2.15	2141	272	12.7	349	2.20	**
56	2315	305	13.2	342	2.30	2511	243	9.7	370	2.15	**

t - X - mean body weight, SD - standard deviation, V - variation coefficient, C - feed conversion.  
X, SD i dW - in (g), \* -  $P < 0.05$ , \*\* -  $P < 0.01$ .



The consumption was 350g/specimen, compared with the control group using 190 g/specimen daily. At that period of the chickens' life, the daily use of feeds was similar and it was 140g in the experimental group and 95g/specimen in the control. Increased water consumption influenced the increase in the intake of fodder. On the 28th day of their life the birds differed significantly in the body weight ( $P<0.05$ ), tab. 3. Similar results were received the 35<sup>th</sup> day of the broilers' life, that is after 2 weeks after having been given the *Yucca schidigera* extract. The chickens' body weight showed significant differences in the experimental group compared with the control ( $P<0.05$ ).

The preparation containing saponins played a similar role in the experiments as supplementing feeds or water with salt, which caused an increased water intake connected with higher feed intake consumption, and what follows, the feeds themselves, thus producing the increase in body weight gains of broilers. The effects would be therefore similar to the results obtained by Smith and Teeter (1987), Teeter and others (1985), when the chickens were given water supplemented with KCL.

In the following weeks of the broilers' life, no differences concerning increased water intake by the birds receiving the preparation with saponin compounds in drinking water were observed. The recorded higher intake of water and feeds by the birds receiving Micro-Aid in water only resulted in their higher body weight. The increased intake of water and fodder resulted in body weight differences of the birds until the 56<sup>th</sup> day of life. Higher appetite and better use of alimentary components are proved by statistical significance at the level of ( $P<0.01$ ).

Moreover, the coefficients of feeds conversion (tab. 3) were more advantageous for the group receiving the Micro-Aid saponin preparation than for the control. The results proved a positive effect of the Micro-Aid saponin preparation added to water on the body weight gains in birds. The influence of the *Yucca schidigera* on the increase of body weight gain in poultry and better use of the feeds were previously confirmed by other authors, i. e. Dziku et al., (1985), Johnson et al. (1981, 1982)

On the basis of the studies the conclusion may be arrived at that the saponin preparation added to water may have a similar effect to salt, increasing the uptake of water and feeds by birds and thus result in higher body weight gains in birds.

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## STRESZCZENIE

Celem badań było określenie wpływu dodatku saponin *Yucca schidigera* na pobieranie przez ptaki wody i pasz oraz na tempo ich wzrostu. Do badań użyto kurcząt brojlerów komercyjnych Vedetta. Doświadczenie prowadzono od 21 do 56 dnia życia ptaków w pomieszczeniu klimatyzowanym o ustalonych parametrach mikroklimatu. Kurczęta miały swobodny dostęp do wody i karmy, których zużycie kontrolowano codziennie. Badania wykonano na 60 kogutkach podzielonych na dwie grupy: kontrolną i doświadczalną. Stwierdzono, że dodatek do wody ekstraktu zawierającego saponiny powodował wyższe dzienne zużycie wody 350 g/szt. wobec 190 g/szt. w grupie kontrolnej. Zużycie paszy dla tych grup kształtowało się odpowiednio: 140 g/szt. i 95 g/szt. Końcowa masa ciała ptaków grupy doświadczalnej była istotnie wyższa od grupy kontrolnej. Poziom istotności dla tej cechy wyraził się ryzykiem wnioskowania ( $P < 0,01$ ).