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Response of Carcass Characteristics of Growing White New Zealand Rabbit Fed on Different Biological Treated Roughages

Roshdy I. El-Kady[1] , Ashraf A. A. Morad[1] and Walid S. El-Nattat[2]
[1]*Department of Animal Production, Agriculture and Biological Researches Division, National Research Centre, Dokki, Egypt.*
[2]*Department of Animal Reproduction & Artificial Insemination, Veterinary Researches Division, National Research Centre, Dokki, Egypt.*

THE aim of the present study was to investigate the effect of feeding biological treated rice straw with *Pleurotusostreatus* or treated corn stalks with *Trichodermareesei* at different levels on carcass characteristics of rabbits. Dried treated rice straw (RS) or corn stalks (CS) were used to formulate the experimental pelleted diet by substituting of berseem hay with treated rice straw with medium only (without *Pleurotusostreatus*) and biological treated rice straw with *Pleurotusostreatus* (BTRS) or treated corn stalks with medium only (without *Trichodermareesei*) and biological treated corn stalks with *Trichodermareesei* (BTCS) at different levels. All diets were formulated to be iso-nitrogenous and iso-caloric, and to meet nutrients requirements for growing rabbits. A number of 78 weaned New-Zealand white rabbits about 6 weeks of age and weighed 500 g in average were randomly divided into 13 groups (R1 to R13) 6 rabbits in each. The experimental groups were fed as following the first group fed control diet (0% rice straw or corn stalks) and other 12 groups were fed on diets containing rice straw either with or without fungi or corn stalks either with or without fungi at 33, 66 and 100% as replacing of berseem hay (11, 22 and 33% of total diet). At the end of the experimental period (91 days), three rabbits from each group were slaughtered to evaluate carcass characteristics. The results showed that the values were significantly (P<0.05) higher with the slaughter weight (SW). The eviscerated body (EBW), carcass weight (CW1) and carcass weight and total giblets(CW2) with R13 (BTCS) ration and R6 ration were significantly (P<0.05) higher with CW1, CW2 and BTRS rations than other experimental rations. While SW, EBW, CW1 and CW2 were significantly lower with R2 (NBTRS) ration than other experimental rations. Values of the dressing percentage (DP1) showed that R6 (BTRS) ration was significantly higher while R3 (NBTRS) ration was significantly lower than other experimental rations. The values of the dressing percentage (DP3) showed that R10 (NBTCS) ration and R12 (BTCS) rations were significantly higher than other experimental rations. The average values of carcass cuts showed that R5 and R6 with (BTRS) rations were improved (P<0.05). The excellent carcass cuts weight (middle part than that of the control diet). It’s worthy to recommend the treated rice straw or corn stalks with fungi to be used to enhance carcass characteristics in rabbits’ diet.

Conclusion : It was concluded that the treatment of rice straw with *Pleurotusostreatus* and corn stalks with *Trichodermareesei* (especially the replacement of berseem hay with 100% of the biological treated BTRS and BTCS) had beneficial returns on the carcass characteristics (traits) of the growing white New Zealand rabbits.

Keywords : Rabbit, Rice straw, Corn stalk, *Pleurotusostreatus*, *Trichodermareesei*, Carcass traits.

Corresponding author : Walid S. El-Nattat, E.mail: elnattat@gmail.com
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Introduction

The farm animals in Egypt suffer from shortage of feed and also, they are continuously increasing in prices. Annually in Egypt, about 25 million tons of agricultural by-products produced [1]. The nutritive value of agricultural by-products can be enhanced through their biological treatments. It was estimated that about 13.0 million tons of total digestible nutrients (TDN) are required per year in Egypt, while only 9.6 million tons are annually produced providing 75% of livestock energy requirements [2]. Such low quality roughages (rice straw and corn stalks) are high in lignocellulytic materials and are generally low in carbohydrates, nitrogen and certain minerals bioavailability. Also, its utilization is limited due to high transportation cost [3-4].

A great deal of research was carried out to increase the use of this by-products and increasing its feeding value. Intake and utilization of such roughages can be increased by supplementation with some nutrients or by applying physical, chemical or biological treatments[5-6]. Biological method showed the most effective method among the different methods [4, 7]. Hernandez et al. [8] mentioned that rabbits can contribute to solve the meat shortage in developing countries, because rabbits have rapid growth rate, high fertility, short gestation period, short generation intervals, high feed efficiency, early marketing age, high muscle bone ratio also, its meat has high protein, low fat and cholesterol content.

Morad [9] and Abd El-Hakim et al. [7] stated that feeding biologically treated corn stalks and rice straw did not significantly affect the dressing percentage of rabbits, while El-Badawiet al. [10] reported that feeding biologically treated sugar beet pulp significantly increased dressing percentage for rabbits.

This study aimed to study the effect of replacing berseem hay by the biologically treated rice straw with *Pleurotusostreatus* or by the biologically treated corn stalks with *Trichodermareesei* on carcass characteristics of growing rabbits.

Materials and Methods

The experimental work was carried out at El-Nubaria Experimental and Production Station, Rabbit Research Unit, El-Imam Malik Village, Behira Governorate, Egypt.

Microorganism

The spawn of the mushroom (*Pleurotusostreatus*) mycelia grown on sorghum grains was purchased from mushroom production unit, while the *Trichodermareesei* was obtained from Agriculture Microbiology Department, at the National Research Center, Dokki, Egypt.

Mycotoxin determination

A thin layer chromatography was used for determination of mycotoxin in the treated material according to the method adopted by Fadel et al.[11] and AOAC [12].

Experimental animals

A total number of 78 weaned New Zealand white rabbits (6 weeks old and about 500 g ± 20 body weight) were randomly distributed into 13 experimental groups (*n* = 6/group). Each group was divided into three replicates, two rabbits in each.

The thirteen groups were fed as follow :

R1 was fed on control ration [13] and kept as control group. R2-R7 were fed on diets containing rice straw that replaced clover hay at levels of 33, 66, and 100% with no biological treatment (NBTRS) for R2-R4 and with biological treatment with *Pleurotusostreatus* (BTRS) for R5-R7. The other six groups R8-R13 were fed on diets containing corn stalks that replaced clover hay at levels of 33, 66 and 100% with no biological treatments (NBTCS) for R8-R10 and with biological treatment with *Trichodermareesei* (BTCS) for R11-R13. All animals were kept under the same managerial and hygienic conditions and housed in wire cages galvanized (50×50×45 cm). Each replicate involved two rabbits housed separately in metal cages and provided with ration and water *ad libitium.* The ambient temperature was 27-28°C with a relative humidity 70%. Natural light and ventilation were adopted. Feed troughs were secured with an internal edge with suitable depth to minimize feed scattering. The experimental period lasted for 13 weeks (91 days). All diets (pelleted with diameter 4 mm) were formulated to be iso-nitrogenous and iso-caloric to meet the nutrients requirements for growing rabbits.

Collection of samples

At the end of the feeding trial, animals were fasted overnight (12 hrs) before slaughtering. Rabbits were individually weighed, then they were slaughtered according to the Islamic legislation using sharp knife and cutting the jugular veins without cutting the whole neck till complete bleeding. Then, the head was cut and the slaughter weight (SW) was recorded. After skinning off, the skin, the viscera, the lung, the heart, the liver and the two kidneys were removed and weighed separately. The eviscerated body (EBW) was weighed to evaluate the dressing percentage. CW1 is the carcass weight while the CW2 is the carcass weight + the edible offal (giblets). While, the DP1 is calculated from CW1/SW, the DP2 is calculated from CW1/EBW and finally, the DP3 is calculated from CW1 + total edible offal (giblets) / EBW. Carcass cuts included fore, middle, hind parts and the head with the neck were weighed.

Statistical analysis

Collected data were analysed statistically using the one way ANOVA and the Duncan's multiple range test was used for the significant different means at (P<0.05).

Results

The average values of SW, EBW, CW1, CW2 of the experimental groups are presented in Table 1. The results showed that values were significantly higher with SW, EBW, CW1 and CW2 with R13 (BTCS) ration also R4 was significantly higher for CW1 and CW2 with BTRS rations than other experimental rations. While SW, EBW, CW1 and CW2 were significantly lower with R2 (NBTRS) ration than other experimental rations.

Data of CW2 (g), showed that R8 and R13 were significantly higher (P<0.0167) while R2 was lower significantly than other rations. No significant differences were detected between other experimental rations.

The average values of the dressing percentage and carcass cuts of experimental groups were presented in Table 2. The results showed that DP1 with R6 ration was significantly higher (P<0.0270) while, R3 ration was significantly lower than other rations. The results showed also that, DP2 for R1was significantly higher (P<0.0163) than other rations while, average values of DP3 showed that R10 and R12 rations were significantly higher (P<0.0032) on the other hand, R3 ration was significantly lower than other rations.

The results of middle parts for carcass cuts (Table, 2) showed that R5 and R6 rations were significantly higher (P<0.0012) while, R2 was significantly lower than other experimental rations. The results of hind part showed that R13 was significantly higher (P<0.0300) while, R2 ration was significantly lower than the other rations. The results of head and neck parts showed that R6 ration was significantly higher (P<0.0065) than that of control (Table, 2).

The average values of external and edible offal are presented in Table(3). The average values of fur weight showed that R1, R9, R11 and R13 rations were significantly higher (P<0.0271) while, R2 ration was significantly lower than other experimental rations. The average values of limbs weight showed that R3 ration was significantly higher (P<0.0001) while, R6 ration was significantly lower than other experimental rations. The lowest value was detected with R2 ration than other experimental rations. The average values of tail weight (g) showed that R9 was significantly higher (P<0.0473) while, R2 was significantly lower than other experimental rations. The average values of ears weight (g) showed that R11 ration was significantly higher (P<0.0051) while, R2 was significantly lower than other experimental rations.

The average values of total non-edible parts weight (g) showed that R13 ration was significantly higher (P<0.0430) while, R2 ration was significantly lower than other experimental rations.

The average values of liver (g) showed that R12 ration was significantly higher (P<0.0001) while, R2 was significantly lower than other experimental rations. The average values of total edible parts (g) showed that R5, R7, R12 and R13 rations were significantly higher (P<0.0001) while, R2 ration was significantly lower than other experimental rations.

The average values of digestive tract (g) of experimental groups were presented in Table 4. The results of weight of gastro-intestinal tract (GIT) including the digesta (g) showed that R13 was significantly higher (P<0.0162) while, R2 ration showed significantly lower than other experimental rations. No significant differences were observed in values between other experimental rations. The results of weight of GIT free of digesta (g) showed that R13 ration was significantly higher (P<0.0129) while, R8 ration was significantly lower than other experimental rations. No significant differences were observed in values between other experimental rations. The results of weight of digesta (g) showed that R13 was significantly higher (P<0.0247) while, R2 was significantly lower than other experimental rations.

TABLE 1.Effects of biological treatments and substituting levels of rice straw and corn stalks on some carcass characteristics of rabbits.

Item	Clover hay (CH)	Rice straw (RS)						Corn stalks (CS)						P>F
		Non biological treated RS by *Pleurotusostreatus* fungi (NBTRS)			Biological treated RS by *Pleurotusostreatus* fungi (BTRS)			Non biological treated CS by *Trichodermareesei*fungi(NBTCS)			Biological treated CS by *Trichodermareesei*fungi (BTCS)			
	Control	11%	22%	33%	11%	22%	33%	11%	22%	33%	11%	22%	33%	
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}	
Rabbit weight before slaughter (SW) (g)	2348.00^{abc} ± 244.78	1937.00^{c} ± 79.93	2266.33^{bc} ± 176.51	2313.33^{abc} ± 129.53	2520.00^{ab} ± 82.54	2534.67^{ab} ± 48.66	2370.00^{ab} ± 202.91	2302.33^{bc} ± 79.46	2319.33^{abc} ± 113.20	2315.67^{abc} ± 179.30	2549.33^{ab} ± 32.09	2376.67^{ab} ± 26.42	2744.00^{a} ± 27.05	0.0251
Empty body weight (EBW) (g)	2121.67^{abc} ± 221.08	1750.33^{c} ± 72.10	2047.67^{bc} ± 159.52	2090.33^{abc} ± 116.97	2277.00^{ab} ± 74.64	2290.33^{ab} ± 44.04	2141.67^{ab} ± 183.46	2080.33^{bc} ± 71.76	2095.67^{abc} ± 102.24	2092.33^{abc} ± 162.14	2303.67^{ab} ± 29.11	2147.33^{ab} ± 23.98	2479.33^{a} ± 24.49	0.0252
Carcass weight (CW1) (g)	1256.67^{abc} ± 124.24	1050.67^{c} ± 42.77	1161.00^{bc} ± 119.51	1262.67^{abc} ± 96.61	1368.33^{ab} ± 50.59	1425.67^{a} ± 37.82	1276.00^{abc} ± 116.38	1279.00^{abc} ± 35.14	1222.00^{abc} ± 41.58	1290.33^{abc} ± 88.65	1394.00^{ab} ± 7.04	1313.33^{ab} ± 9.90	1448.33^{a} ± 53.81	0.0271
Carcass weight (CW2) (g)	1357.33^{abc} ± 135.43	1144.00^{c} ± 43.46	1279.00^{bc} ± 123.76	1388.00^{abc} ± 106.22	1503.67^{ab} ± 48.57	1549.00^{a} ± 39.82	1411.33^{ab} ± 118.53	1399.67^{ab} ± 38.52	1344.00^{abc} ± 46.50	1415.33^{ab} ± 99.04	1520.67^{ab} ± 9.59	1458.67^{ab} ± 10.42	1591.67^{a} ± 49.50	0.0167

Different letter superscripts (a, b…etc.) indicate a significant difference between means within row using the multiple range Duncan's test at P<0.05.

TABLE 2. Effects of biological treatments and substituting levels of rice straw and corn stalks on dressing percentage and carcass cuts (g) for rabbits.

Item	Clover hay (CH)	Rice straw (RS)						Corn stalks (CS)						P>F
		Non biological treated RS by *Pleurotusostreatus* fungi (NBTRS)			Biological treated RS by *Pleurotusostreatus* fungi (BTRS)			Non biological treated CS by *Trichodermareesei*fungi(NBTCS)			Biological treated CS by *Trichodermareesei*fungi (BTCS)			
	Control	11%	22%	33%	11%	22%	33%	11%	22%	33%	11%	22%	33%	
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}	
Dressing percentage (DP1)	$53.67^{abc} \pm 0.29$	$54.31^{ab} \pm 1.05$	$50.78^{c} \pm 1.22$	$54.23^{ab} \pm 1.35$	$54.27^{ab} \pm 0.56$	$56.21^{a} \pm 0.43$	$53.69^{abc} \pm 0.51$	$55.63^{ab} \pm 0.63$	$52.91^{abc} \pm 1.95$	$56.03^{ab} \pm 1.95$	$54.71^{ab} \pm 0.52$	$55.27^{ab} \pm 0.39$	$52.73^{bc} \pm 1.63$	0.0270
Dressing percentage (DP2)	$68.39^{a} \pm 5.40$	$60.10^{b} \pm 1.16$	$56.20^{b} \pm 1.35$	$60.03^{b} \pm 1.50$	$60.06^{b} \pm 0.62$	$62.20^{b} \pm 0.47$	$59.41^{b} \pm 0.56$	$61.57^{b} \pm 0.70$	$58.56^{b} \pm 1.19$	$62.01^{b} \pm 2.16$	$60.55^{b} \pm 0.57$	$61.18^{b} \pm 0.44$	$58.36^{b} \pm 1.80$	0.0163
Dressing percentage (DP3)	$64.12^{cd} \pm 0.28$	$65.51^{abc} \pm 1.19$	$62.05^{d} \pm 1.14$	$65.99^{abc} \pm 1.64$	$66.04^{abc} \pm 0.31$	$67.59^{ab} \pm 0.45$	$65.96^{abc} \pm 0.16$	$67.37^{abc} \pm 0.52$	$64.37^{bcd} \pm 1.09$	$67.90^{a} \pm 1.77$	$66.05^{abc} \pm 0.75$	$67.95^{a} \pm 0.42$	$64.15^{cd} \pm 1.63$	0.0032
Fore (g)	$384.67^{a} \pm 44.75$	$320.00^{a} \pm 15.96$	$340.00^{a} \pm 30.29$	$373.33^{a} \pm 33.67$	$395.00^{a} \pm 14.23$	$399.00^{a} \pm 7.13$	$392.33^{a} \pm 35.53$	$386.67^{a} \pm 14.40$	$370.33^{a} \pm 12.51$	$399.33^{a} \pm 32.97$	$407.67^{a} \pm 8.46$	$426.67^{a} \pm 23.67$	$448.33^{a} \pm 19.95$	0.0792
Middle (g)	$228.33^{cd} \pm 10.94$	$190.67^{d} \pm 10.86$	$236.33^{bcd} \pm 35.06$	$292.67^{ab} \pm 20.84$	$306.33^{a} \pm 17.75$	$306.33^{a} \pm 14.32$	$254.33^{abc} \pm 28.74$	$266.00^{abc} \pm 14.26$	$242.67^{abcd} \pm 19.47$	$271.67^{abc} \pm 25.42$	$291.33^{abc} \pm 4.90$	$258.00^{abc} \pm 13.73$	$298.00^{ab} \pm 12.20$	0.0012
Hind (g)	$477.00^{abcd} \pm 56.19$	$392.00^{d} \pm 13.75$	$413.00^{cd} \pm 46.92$	$435.33^{bcd} \pm 38.04$	$493.00^{abc} \pm 17.37$	$524.33^{ab} \pm 14.40$	$461.33^{abcd} \pm 45.96$	$454.67^{abcd} \pm 9.94$	$450.00^{abcd} \pm 10.53$	$448.33^{abcd} \pm 24.48$	$517.33^{ab} \pm 8.57$	$470.00^{abcd} \pm 11.48$	$533.33^{a} \pm 21.49$	0.0300
Head & neck (g)	$168.33^{bc} \pm 14.54$	$148.00^{c} \pm 3.48$	$171.67^{b} \pm 7.95$	$161.33^{bc} \pm 7.80$	$174.00^{b} \pm 2.99$	$196.00^{a} \pm 5.67$	$168.00^{bc} \pm 8.42$	$171.67^{b} \pm 3.55$	$159.00^{bc} \pm 0.97$	$171.00^{bc} \pm 10.81$	$177.67^{ab} \pm 2.56$	$158.67^{bc} \pm 5.87$	$168.67^{bc} \pm 3.39$	0.0065

Different letter superscripts (a, b…etc.) indicate a significant difference between means within row using the multiple range Duncan’s test at $P<0.05$.

TABLE 3. Effects of biological treatments and substituting levels of rice straw and corn stalks on external and edible offal (giblets) (g) for rabbits.

Item	Clover hay (CH)	Rice straw (RS)						Corn stalks (CS)						P>F
		Non biological treated RS by *Pleurotusostreatus* fungi (NBTRS)			Biological treated RS by *Pleurotusostreatus* fungi (BTRS)			Non biological treated CS by *Trichodermareesei* fungi (NBTCS)			Biological treated CS by *Trichodermareesei* fungi (BTCS)			
	Control	11%	22%	33%	11%	22%	33%	11%	22%	33%	11%	22%	33%	
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}	
Blood weight (g)	80.33^{a} ± 18.28	63.33^{a} ± 10.21	96.67^{a} ± 7.60	90.33^{a} ± 8.57	73.00^{a} ± 5.45	89.33^{a} ± 4.98	77.33^{a} ± 9.43	87.67^{a} ± 13.70	78.00^{a} ± 2.63	72.00^{a} ± 13.27	81.33^{a} ± 7.35	75.00^{a} ± 4.83	106.00^{a} ± 20.11	0.3894
Fur weight (g)	340.33^{a} ± 44.49	249.00^{c} ± 17.27	264.33^{bc} ± 30.20	281.67^{abc} ± 9.30	329.00^{ab} ± 8.25	307.67^{abc} ± 4.46	287.67^{abc} ± 31.53	290.67^{abc} ± 15.43	340.67^{a} ± 37.26	274.00^{abc} ± 17.08	345.67^{a} ± 9.47	301.00^{abc} ± 9.66	338.67^{a} ± 4.20	0.0271
Limb's weight (g)	85.33^{de} ± 6.91	79.33^{e} ± 2.59	113.67^{a} ± 2.74	83.67^{de} ± 5.30	93.33^{cd} ± 1.48	99.33^{c} ± 2.49	89.67^{cde} ± 7.18	91.67^{cd} ± 2.11	92.00^{cd} ± 0.63	91.33^{cde} ± 2.20	111.00^{ab} ± 0.97	88.67^{cde} ± 4.42	100.33^{bc} ± 2.43	0.0001
Tail weight (g)	16.67^{abcd} ± 1.87	14.00^{d} ± 0.37	14.33^{cd} ± 3.90	16.33^{abcd} ± 3.60	19.33^{abcd} ± 0.92	20.33^{abcd} ± 0.42	16.00^{abcd} ± 1.10	20.00^{abcd} ± 3.48	23.33^{a} ± 2.74	20.00^{abcd} ± 1.32	21.67^{ab} ± 1.48	20.67^{abcd} ± 1.28	21.33^{abc} ± 0.42	0.0473
Ear's weight (g)	35.33^{cd} ± 3.80	30.67^{d} ± 1.17	42.00^{abc} ± 2.99	35.33^{cd} ± 2.35	38.33^{abcd} ± 1.48	35.67^{bcd} ± 1.80	35.33^{cd} ± 2.64	35.67^{bcd} ± 1.12	37.67^{abcd} ± 1.38	39.00^{abc} ± 3.60	44.67^{a} ± 2.14	40.33^{abc} ± 1.38	43.33^{ab} ± 2.74	0.0051
Total non-edible parts weight (g)	558.00^{ab} ± 72.82	436.33^{c} ± 26.23	531.00^{abc} ± 34.97	507.33^{abc} ± 22.68	553.00^{ab} ± 7.65	552.33^{ab} ± 4.82	506.00^{abc} ± 48.65	525.67^{abc} ± 24.29	571.67^{ab} ± 42.71	496.33^{bc} ± 33.34	604.33^{ab} ± 13.63	525.67^{abc} ± 10.02	609.67^{a} ± 17.87	0.0430
Kidneys (g)	17.67^{a} ± 2.01	16.33^{a} ± 0.84	18.33^{a} ± 0.76	20.00^{a} ± 1.26	20.00^{a} ± 1.10	19.00^{a} ± 1.32	19.33^{a} ± 2.23	20.33^{a} ± 0.21	17.33^{a} ± 0.92	19.67^{a} ± 2.08	18.33^{a} ± 1.28	21.00^{a} ± 0.37	21.33^{a} ± 1.52	0.3213
Liver (g)	61.00^{de} ± 6.46	56.33^{e} ± 2.95	72.67^{cde} ± 4.04	83.33^{abc} ± 8.92	88.33^{abc} ± 5.13	76.67^{bcd} ± 1.84	92.00^{abc} ± 9.13	73.67^{cde} ± 6.30	82.67^{abc} ± 7.40	76.67^{bcd} ± 10.57	82.33^{abc} ± 4.77	102.00^{a} ± 2.22	95.33^{ab} ± 3.75	0.0001
Heart (g)	7.00^{d} ± 0.73	7.00^{d} ± 0.73	10.33^{abcd} ± 1.05	7.67^{cd} ± 0.42	9.67^{abcd} ± 0.42	11.67^{a} ± 0.56	8.00^{bcd} ± 0.37	8.67^{abcd} ± 0.21	8.33^{abcd} ± 0.42	11.33^{ab} ± 1.80	9.00^{abcd} ± 1.32	9.67^{abcd} ± 1.48	10.67^{abc} ± 2.08	0.0255
Lungs (g)	14.00^{a} ± 2.53	12.67^{a} ± 0.21	15.67^{a} ± 0.76	13.33^{a} ± 0.42	16.33^{a} ± 0.92	15.00^{a} ± 1.67	15.00^{a} ± 1.32	17.00^{a} ± 1.90	12.67^{a} ± 0.56	16.33^{a} ± 2.74	16.00^{a} ± 0.00	11.67^{a} ± 1.05	15.00^{a} ± 0.73	0.1852
Spleen (g)	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	1.00^{a} ± 0.00	--
Total edible parts (g)	100.67^{bc} ± 11.20	93.33^{c} ± 1.65	118.00^{ab} ± 4.31	125.33^{ab} ± 9.62	135.33^{a} ± 5.90	123.33^{ab} ± 2.76	135.33^{a} ± 11.81	120.67^{ab} ± 7.85	122.00^{ab} ± 7.29	125.00^{ab} ± 16.81	126.67^{ab} ± 3.94	145.33^{a} ± 1.48	143.33^{a} ± 5.85	0.0010

Different letter superscripts (a, b…etc.) indicate a significant difference between means within row using the multiple range Duncan's test at P<0.05.

TABLE 4. Effects of biological treatments and substituting levels of rice straw and corn stalks on digestive tract (g) for rabbits.

Item	Clover hay (CH)	Rice straw (RS)						Corn stalks (CS)						P>F
		Non biological treated RS by *Pleurotusostreatus* fungi (NBTRS)			Biological treated RS by *Pleurotusostreatus* fungi (BTRS)			Non biological treated CS by *Trichodermareesei* fungi (NBTCS)			Biological treated CS by *Trichodermareesei* fungi (BTCS)			
	Control	11%	22%	33%	11%	22%	33%	11%	22%	33%	11%	22%	33%	
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}	R_{11}	R_{12}	R_{13}	
Weight of GIT including the digesta (g)	432.67^{bc} ± 38.21	356.67^{c} ± 19.22	456.33^{abc} ± 39.09	418.00^{bc} ± 6.10	463.33^{ab} ± 30.48	433.33^{bc} ± 4.23	452.67^{abc} ± 36.96	377.00^{bc} ± 21.81	403.67^{bc} ± 25.09	404.00^{bc} ± 66.33	424.33^{bc} ± 17.90	394.33^{bc} ± 11.70	542.67^{a} ± 23.33	0.0162
Weight of GIT free of the digesta (g)	206.33^{bc} ± 15.97	170.00^{bc} ± 13.17	237.67^{ab} ± 31.23	195.00^{bc} ± 6.46	220.33^{abc} ± 22.58	189.00^{bc} ± 1.32	224.33^{abc} ± 18.46	155.00^{c} ± 15.20	178.00^{bc} ± 14.09	180.67^{bc} ± 53.32	178.67^{bc} ± 15.58	165.00^{bc} ± 9.44	278.00^{a} ± 22.82	0.0129
Weight of the digesta (g)	226.33^{abc} ± 23.70	186.67^{c} ± 7.83	218.67^{bc} ± 16.99	223.00^{bc} ± 12.56	243.00^{ab} ± 7.90	244.33^{ab} ± 4.62	228.33^{ab} ± 19.45	222.00^{bc} ± 7.69	223.67^{bc} ± 10.96	223.33^{bc} ± 17.16	245.67^{ab} ± 2.97	229.33^{ab} ± 2.43	264.67^{a} ± 2.56	0.0247

Different letter superscripts (a, b…etc.) indicate a significant difference between means within row using the multiple range Duncan's test at $P<0.05$.

Discussion

During the twentieth century, the agriculture waste products envisaged a great problematic to deal with. Vast field trends were tried to utilize the waste of agriculture cropping all over the world. Many investigators have attempted to invest these wastes in the animal production field especially the farm ruminant animals. The rabbit, considered as pseudo-ruminant, can use the lignin and cellulose in the rice straw and corn stalk. Hence, rabbit was one of the farm animals that has its share in concerning these trials. In the present study, the rice straw and corn stalks were used as they represent a great problem in Egypt especially after cropping. But they have low nutritional values if used without treatments. Mushroom has a high nutritive value. Thence, the treatment of these low nutritional values stuffs with a high one has its economic value in this field. The effects of these treatment on the rabbit's meat production were figured in Tables 1-4. In general, the treatment of the rice straw and corn stalks with the biological microorganisms *Pleurotusostreatus* and *Trichodermareesei* had ameliorated the different carcass trails of slaughtered rabbits. Thayalim and Samanasinghe[14] found that the addition of affective microorganism to rabbit diet increased the dressing percentage. Ahmed [15] observed that using wheat straw treated with fungi *T. reesei* in rabbit ration gave the highest value of dressing percentages (60.28%) while, rabbits given 15% wheat straw gave the lowest value (50.04%). El Badawi et al. [10] reported that the dressing percentage for rabbits fed diets contained 25 and 50% fungal treated sugar beet pulp were (75.15 and 73.96%, respectively) not significantly different compared with the control (72.14%) but it was significantly ($P<0.05$) higher than for rabbits fed 25 and 50% untreated sugar beet pulp (69.15 and 64.05%, respectively).

On the other hand, Zaza et al. [16] reported insignificant differences in the almost carcass weight and dressing percentage of groups fed biologically treated or non-treated grape pomace. Also, Omer et al. [17] showed that dressing percentage was not affected by addition of 0.5% dried yeast to the rabbit diets, compared with the control group.

The average values of external and edible offal (giblets) for rabbits are shown in Table (3). The predominate trend of the non-edible and edible parts weights gravitated towards the BTCS for all parts then the BTRS compared to their NBTCS, NBTRS and the control. El-Badawi et al. [10] reported that the edible giblets percentage, especially liver, kidneys and heart were higher for rabbits fed fungal treated sugars beet pulp diets especially at 50% compared to the rabbits fed 25% untreated sugar beet pulp and control diets.

The average values of digestive tract (g) for rabbits are shown in Table (4). There were no literature that persuaded these parameters in case of feeding biological treated roughages. Although, the present study had cleared that the average values of weight of GIT free from the digesta (g) and weight of the digesta (g) showed that R13 (BTCS) was significantly higher while R2 (NBTRS) was significantly lower than other experimental rations. No significant differences were detected with the rest of experimental rations. This may indicate that the replacement of clover have with the treatment of corn stalks with the *Trichodermareesei* in the rabbit ration formulation is more effective in GIT capacity and it is palatable for rabbits than the treated rice straw.

Conclusion

From the previous results it could be concluded that, the replacement of clover hay in the rabbit ration formulation with the biologically treated corn stalks with *Trichodermareesei* is more effective than the rice straw treated with *Pleurotusostreatus*. Both have their beneficial and commercial effects on the carcass characteristics of growing rabbits and they will be safely used in the rabbit ration formulation. This will solve the problem of the corn stalks and rice straw wastes in the Egyptian rural areas.

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Conflict of Interest

The authors declare no conflict of interest.

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استجابة خواص الذبيحة لارانب نيوزيلاندية بيضاء نامية مغذاه على مخشنات مختلفة معالجة بيولوجيا

رشدى ابراهيم القاضى [١] ، اشرف انيس مراد [١] و وليد سعيد النطاط [٢]

[١] قسم انتاج حيوانى – شعبة البحوث الزراعية والبيولوجية – المركز القومي للبحوث - القاهرة - مصر.

[٢] قسم التكاثر في الحيوان و التلقيح الاصناعى – شعبة البحوث البيطرية – المركز القومي للبحوث - القاهرة - مصر.

تهدف الدراسة الى استكشاف تأثير التغذية بقش الارز المعالج بفطر Pleurotusostreatus وحطب الذرة المعالج بفطر Trichodermareesei عند مستويات متعددة وذلك على خواص الذبيحة للارانب. وقد استخدم قش الارز المجفف وحطب الذرة في تركيب العليقة التجريبية باحلال دريس البرسيم بقش الارز المعالج وحطب الذرة المعالج عند مستويات مختلفة. وقد تم توزيع عدد ٧٨ ارنب نيوزيلاندى ابيض في عمر الفطام (٦ اسابيع من العمر) على ١٣ مجموعة (مج ١ – مج١٣) كل مجموعة ٦ ارانب. وقد غذيت المجموعات كما يلي: المجموعة الضابطة (٠٪ قش ارز او حطب الذرة) و المجموعات الاثنى عشر غذيت على قش الارز في وجود المعالجة او عدمها وكذلك حطب الذرة المعالج وغير المعالج باحلالها لدريس البرسيم بنسبة ٣٣، ٦٦ ، ١٠٠٪ (١١، ٢٢، ٣٣٪ من العليقة الكلية). وعند نهاية التجربة (٩١ يوم) تم ذبح ثلاثة ارانب من كل مجموعة لتقييم خواص الذبيحة. وقد اظهرت النتائج ان استخدام قش الارز المعالج وحطب الذرة المعالج لهما تأثير ايجابى على تحسين خواص الذبيحة اثناء فترة التجربة. ولذلك فقد استخلص الباحثون ان استخدام حطب الذرة المعالج Trichodermareesei وقش الارز المعالج Pleurotusostreatus في علائق الارانب بعد الفطام امنة على صحة الحيوان وذات فائدة على خواص الذبيحة.