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Effect of Replacing Maize with Normal and Soaked in Acetic Acid Locally Pearl Millet on the Performance of Broilers

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ABSTRACT
This study was carried out to determine the influence of replacing different levels of millet grains instead of corn on the performance of broiler chickens. A total of 300 day-old broiler chicks (Ross 308) were randomly distributed into five groups contains three replicate (20 birds/pen). Each group was fed on the one of the following experimental diets. Diet 1 was the control :100% corn , Diet 2: 100% normal millet, Diet 3:100% soaked millet in acetic acid , Diet 4: 50% corn +50% normal millet, Diet 5: 50%corn+50% soaked millet in acetic acid .All diets were iso nitrogenous and metabolisable energy during starter and finisher phases .Results showed there were significant differences ($P \leq 0.05$) between all treatments in weight gains and feed consumption ,Feed conversion ratio in all periods ,also significant differences in carcass traits , dressing percentage ,carcass cuts recorded in birds which apprehension diets contained normal and soaked millet in acetic acid .Pearl millet grain have been given best performance and carcass traits than corn grains in broilers diets.

KEY WORDS broiler chickens, soaked millet, growth performance, carcass traits, maize re-placement diets, pearl millet, acetic acid.

INTRODUCTION

The need to source, harness, process and utilise alternative feed stuff otherwise known as unconventional feed ingredi-ents in the diets of poultry birds is more critical now than ever. This is because feed cost accounts for over seventy percent of the cost of producing edible meat and eggs (Aduku, 2004). The rising cost of poultry feeds have continued to be a major problem in developing coun-tries as feed cost is about 60 to 70%(Conolly, 2012) compared to about 50 to 60% in developed countries . Cereal grains especially maize which forms the bulk of energy in poultry feeds are in short supply as a result of industrial, livestock and human needs. This has resulted in competition between human and animal for available feed resources, and hence high cost of animal production (Aderolu et al. 2007).

The agricultural production is one of the most vulnerable sectors to climate change (Alexandratos & Bruinsma, 2012). Also, increase in global temperatures, global water deficit, contamination by mycotoxins associated with increasing world population (estimated in 9 billion by2050) will be responsible for substantial reduction of crop yields resulting in price increase and major food security concerns (Al-Amin & Ahmed, 2016; Khanal & Mishra, 2017).Thus, questions about which crops should be considered to overcome those negative effects are major challenges facing the agribusiness (Daryanto, Wang, & Jacinthe2016).In this context, pearl millet may be an alternative crop that exhibits great advantageous physiological characteristics when compared to other cereals as it is resistant to drought, low soil fertility, high salinity and high temperature tolerance (Rai, Gowda, Reddy, & Sehgal, 2008.(These characteristics are due to its extensive root system, which allows effective water and nutrients extraction from deeper soil layers (Netto &Durães, 2005). In addition for being a non-trangenic crop (Dunwell, 2014), millet has a low incidence of mycotoxin contamination compared to other crops, such as wheat and maize (BandyopadhyayKumar, & Leslie, 2007; Jurjevic, Wilson, Wilson, & Casper, 2007;Kumar, Basu, & Rajendran, 2008; Ware et al., 2017; Wilson et al. 2006).Millet

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plantation is widely spread in Dhi Qar Governorate south of iraq. The quantities of millet produced for the years 2016, 2017, 2018, 2019, 2020 are in the range of 3740, 3670, 4741, 5110 and 4458 tons, respectively for the five years above, while the yield of a dunum is an average of 400 kg / Tons. Note that the cost per ton is 266 dollara USA / ton compromised with imported corn 433 dollars USA/ ton (Dhi Qar Agriculture Directorate, 2020). Therefore, the aim of the current study was to solve part of the problem facing poultry breeders in this region by replacing the local millet grains partially and completely replacing yellow corn and knowing the nutritional value For millet grains and chemically analyzed "before and after steeping and inserting them into diets in their normal form or soaked with acetic acid in place of imported yellow corn to see the biological, , productive performance in broiler chicks of Rose 308."

Materials and Methods

This experiment was conducted during November of 2020 and December 2020 in the poultry farm of Faculty of Agriculture -Kufa University. In this study, 300 one day-old unsexed Ross chicks with 38 g initial body weight were used. The chicks were divided into 5 groups and 3 replications, 20 chicks in each. Each group was housed separately in pens. The chicks were fed standard starter rations (from 1 to 21 days), and finisher (from 22 to 35 days). The ingredients analyzed chemically before mixing the diets according to table 1. Diets were formulated to meet the requirements in starter and finisher periods to be iso energetic and iso nitrogenous according to NRC (1994), nutrient requirements for broiler, in particular the recommendations for Ross strain table (2).Millet grains soaking in dilute acetic acid solution at pH(3.0) for 96 hours and drying before milling and mixed in diets.
Groups were randomly assigned to following treatment groups ,T1: control diet contained corn as main grain, T2:normal millet as main grain,T3: soaked millet in acetic acid as main grain,T4:50% corn + 50% normal millet,T5: 50% corn+50% soaked millet. Birds were housed in an environmentally controlled system and growing conditions were similar in all treatments.Birds were vaccinated against (Newcastle disease Lassota strain +Influenza-Vatro Company, Italia at3d age. and infectious bronchitis virus IBH120(Isovac Company), Italia. Newcastle disease and bronchitis virus strain H120 was provided at d 11. Gumboro virus was provided at d 14. Vaccines were prepared per vendor recommendation and were supplied via drinking water after a period of water removal for 3 h.

Experimental procedure

Each experimental group was fed ad-libitum with its own diet for 35 d. Feed intake ,gain weight and feed conversion ratio was determined in each period weekly. The study was conducted according to the International Guidelines for research involving animals (Directive 2010/63/EU, specially slaughtering birds according to the Islamic procedures.

Performance traits

Feed intake (FI, g/bird/period) and body weight gain (BWG, g/bird/period) were recorded for the period at the beginning of the experiment (1d) until the end of the starter period 21^{th}d of age, and finisher period 22^{th}-35^{nd} d of age (Alkassar, 2018). Feed conversion ratio-(FCR) was calculated by dividing feed intake by body weight gain (Alkassar, 2010). On the final day of the experiment,
at 35d-of-age, two bird from each replicate (six from each treatment) was randomly selected slaughtered and dissected manually, plucked and eviscerated. The viscera were removed as for the usual dressing of poultry carcasses. Heart, liver (minus the gall bladder), empty skinned gizzard were trimmed of extraneous tissue and weighed individually and their sum of weights ‘giblets’
was taken. The dressed weights obtained were expressed as a percentage of the live weights and yield parts expressed as a percentage of dress carcass weight

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Statistical analysis

The data obtained from the experiment analyzed by SAS (2001) with a general linear models procedure for ANOVA. Differences between means were analyzed with Duncan's multiple tests(1955). The significant difference statements were based on the possibility ($P<0.05$). by using the following model. $Yij = \mu + Ti + eij$

Where,Yij : is the value of observation of traits.μ : is the overall mean of traits.Ti : The effect of treatments. eij : Random error assumed to be mean equal to zero and variance is σ^2 e ($N \sim 0, \sigma^2 e$).

Table 1. Determined approximate chemical analysis of ingredients in all diets

Nutrient %	Corn	Millet	Wheat	Soybean meal
Moisture	9.5	10.5	11.0	8.0
Dry matter	90.5	89.5	89.0	92.0
Crude protein	8.5	12.0	13.6	48.0
Ether extract	3.5	3.0	2.1	2.6
Crude fiber	2.5	5.0	3.2	6.4
Nitrogen free extract(NFE)	74.0	64.0	69.1	24.0
Ca	0.05	0. 6	0.05	0.7
P	0.08	0. 2	0.3	0.96
ME kcal / kg	3350	3000	3250	2230
Bioactive compound in millet				
Compound(ppm)	Before-soaked in acetic acid		After -soaked in acetic acid*	
phenols	5.8		0	
flavonoid	47.48		31.54	
alkaloid	3.6		0.56	
tannin	8.4		0	

*pH value of acetic acid solution =3.0

Table 2 Basal diets for all treatments

stages	**Starter**					**Finisher**				
periods	**0-3 weeks**					**4-5 weeks**				
Ingredients (%)	T1*	T2	T3	T4	T5	T1	T2	T3	T4	T5
corn	50.0	-	-	25.0	25.0	55.0	-	-	27.5	27.5
wheat	8.0	9.8	9.8	8.8	8.8	9.9	11.8	11.8	11.0	11.0
millet	-	50.0	-	25.0	-	-	55.0	-	27.5	-
millet soaked in acetic acid	-	-	50. 0	-	25.0	-	-	55.0	-	27.5
Soybean meal	36.9	32.8	32.8	34.9	34.9	28.5	24.0	24.0	26.1	26.1
Premix**	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Corn oil	1.6	3.9	3.9	2.8	2.8	3.1	5.7	5.7	4.4	4.4
Di Calcium phosphate	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Limestone	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total	100	100	100	100	100	100	100	100	100	100
Calculated chemical analysis										
ME (kcal/kg)	3024	3023	3023	3026	3026	3201	3204	.3204	3204	3204
Crude protein(%)	23.5	23.5	23.5	23.5	23.5	20.2	20.2	20.2	20.1	20.1
Total Ca(%)	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Avail. Phosphorus(%)	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Lysine (%)	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33	1.33
Methionine (%)	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Methionine + Cysteine	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Crude fiber (%)	3.86	3.86	3.86	3.86	3.86	3.56	3.56	3.56	3.56	3.56
Calorie : Protein Ratio	128. 6	128.5	128.5	128.7	128.7	156.0	156.5	156.5	156.6	156.6

*T1:(50% Corn) ,T2:(50% normal pearl millet ,T3:(50% millet soaked in acetic acid) , T4:(25% corn + 25% normal millet) ,T5:(25% corn + 25% millet soaked in acetic acid)

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**Jordanian premix (provimi): contains ME 4900 kcal / kg, crude protein 18%, fat 1.1%, calcium 15-19%, lysine 9.4%, available phosphorus 13.1%, sodium 4.8%, chlorine 5.8% , Methionine 7.8%, methionine + cysteine + MHA 7.8%, threonine 0.55%, and it contains a mixture of vitamins and trace minerals to secure the needs of the bird, with some enzymes (phytase, alpha-amylase, glyconase).

Results and Discussion

The effects of replacing corm by millet on broiler performance at starter , finisher and total periods are shown in table 3. body weight gain (BWG), Feed consumption, feed conversion ratio (FCR), significantly improved ($P<0.01$) by feeding millet grain soaked in acetic acid(T3) as a main cereals instead of corn than all treatments and gave 809.8 g/bird Vs. 587.1 g/bird in control group (T1) in starter periods ,but didn't different significantly at finisher periods. Also T3,T2 recording significant($P<0.05$) high value at total periods 2043.3,2035.7 g/bird respectively , while the lowest value recorded in T4,T5,T1. The significant improvement achieved in the weights of the birds may be due to the result of a total infusion of millet with 100% acetic acid (T3 in treatment T3), which led to a decrease in the pH of the digestive system, which resulted in an increase in the number of beneficial bacteria while at the same time reducing the number of harmful bacteria, thus increasing the rate of digestion of elements. Nutritional profile as a result of the increased proliferation of beneficial bacteria on the mucous layer spread over the mucin fiber network that covers the intestinal cells. This network provides an appropriate environment for its growth and the production of low-chain organic acids by the Lactobacilli bacteria Inside the intestine, which improves the movement of the fruit and increases its numbers, the flow of blood in the mucous layer before the wall of the intestine, which enters the bloodstream, i.e. increases the efficiency of the absorption of nutrients, resulting in higher rates of metabolism inside the body (Fascina et al., 2012; Adnan et al,2016).

The highest feed consumption different significantly($P<0.05$) at finisher and total periods only since T3, recorded 1982.0 and 3076.3 g/bird, the lowest feed consumption were observed in control group(T1) 1731.3,2617.7 g/bird at finisher and total periods respectively. while there were no significant differences among all treatments in feed conversion ratio at all periods. In general, we notice that birds that ate diets that contained millet grains soaked in vinegar whole or split with soaked in citric acid were the largest consumers of diets compared to birds that consumed diets that contained yellow corn grains whole or split with regular millet, and the reason may be due to the improvement of the protein and substance digestion factor Organic as the lactobacillus bacteria increases the secretion of the enzyme amylase, which works to break down starch molecules, as well as the beta-glucanase enzyme, which contributes to reducing the viscosity of the intestinal contents and thus the exit of the undigested parts more quickly and the emptying of the contents of the gizzard faster, which generates neurological signals to the bird by repeated eating the feed Times more often to appear as eating more feed (Jin et al. 1997; Gond&Wollny, 2005).Or perhaps there was a significant decrease in the concentrations of anti-nutrients in millet grains as a result of soaking with acid solutions, as the amount of tannins reached 8.4 parts per million with millet before soaking and became zero parts per million after soaking, and thus resulted in an increase in the readiness to digest the nutrients and minerals and then increase their absorption to achieve higher Rates of metabolism within the bird's body (Pawar and Machewad, 2006) it seems that Organic acids cause a decrease in the pH value inside the intestine of the bird, and this leads to the expulsion of harmful bacteria by controlling their sites in the feeds by the beneficial bacteria, which improves the absorption of various nutrients, thus increasing the average weight of the bird and achieving weight gain during a certain period (Adel et al., 2010) N, as well as giving acids. The feed soaked with its solutions has the palatable taste of the feed (Nourmohammadi, et al,2012), and as a result, the level of secretion of both hydrochloric

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acid and pepsin generator, which are secreted in the stomach, causes a decrease in the stomach acidity due to the increase in the acidity of the feed material, which creates a better environment for the action of pepsin in the proteolysis in the stomach. And the increase in digestibility of amino acids (Blank et al., 1999)

Table3. average of some productive traits of broiler at (0-3), (4-5) and (0-5) weeks of age.

Treatment	Body weight gain(g/bird)			Feed consumption (g/bird)			Feed Conversion Ratio		
No	0-3wk	4-5wk	0-5wk	0-3wk	4-5wk	0-5wk	0-3wk	4-5wk	0-5wk
T1*	587.1^{c} ± 2.8	1200.7 ± 6.38	1779.0^{c} ± 11.59	885.9 ± 32.1	1731.3^{c} ± 25.7	2617.7^{c} ± 57.5	1.50 ± 0.04	1.43 ± 0.02	1.46 ± 0.02
T2	731.1^{ab} ± 9.6	1304.7 ± 6.48	2035.7^{a} ± 4.40	989.3 ± 15.6	1965.7^{a} ± 18.7	2954. 7^{b} ± 13.4	1.35 ± 0.01	1.50 ± 0.00	1.45 ± 0.005
T3	809.5^{a} ± 32.6	1233.7 ± 4.93	2043.3^{a} ± 30.86	1094.3 ± 50.0	1982.0^{a} ± 63.0	3076.3^{a} ± 112.9	1.34 ± 0.02	1.60 ± 0.05	1.50 ± 0.04
T4	642.0^{bc} ± 55.9	1232.3 ± 9.82	1874.0^{bc} ± 31.74	1005.3 ± 117.3	183.7^{bc} ± 71.6	2840.0^{b} ± 168.0	1.56 ± 0.10	1.47 ± 0.02	1.51 ± 0.02
T5	641.0^{bc} ± 51.3	1183.7 ± 31.63	1825.0^{bc} ± 87.23	1015.1 ± 83.8	1837.0^{bc} ± 98.0	2852.3^{b} ± 164.3	1.59 ± 0.11	1.54 ± 0.01	1.56 ± 0.03
Significant	**	NS	*	NS	*	*	N.S	N.S	N.S

*T1(corn only),T2(normal millet only),T3(millet only soaked in acetic acid),T4(50%corn+50% normal millet),T5(50%corn+50% soaked millet)

^{a,b,c} Means bearing different superscript in a column differ significantly **(P<0.0l), *(P<0.05).

The significant improvement in the feed conversion factor for the birds of the treatments that included chemical treatments for millet is mainly due to the increase in the weight gain rates for the birds of these treatments as a result of the presence of the highest level of amino acid balance, and their quality present in millet grains is better than that found in yellow corn, in addition to the quality of the fatty acids in the fat of millet grains, with the breakdown of some fibers and complex carbohydrates during mulching with acids, an increase in the quantity and quality of the bird's nutrient readiness to make the bird express its genetic capabilities as much as possible through the least amount of feed consumed to achieve the highest rates of weight gain, which is What we express by the food conversion factor These results did not agree with what they reached: Nourmohammadi,et al,2012, Sanaa et al,2015).

Those who noticed significant differences in the nutritional conversion factor of the treatment birds with citric acid added by 3% to the diet compared with the control treatment. Perhaps the reason is due to the role of organic acids that increase the utilization of nutrients and thus increase body weight (Brzóska, 2013). On the other hand, the steeping process has an important role in increasing the effectiveness of enzymes in the release of nutrients, and thus the birds' benefit from them and raising the food conversion factor (Yasar and Forbes, 2000). The results of the current study agreed with Adil et al (2011) who showed that there were no significant differences in the feed conversion factor between birds in the comparison group and treatment birds with organic acids added to them.

All birds which consumption diets contained normal and soaked millet as a sole source of grains appears significant differences (P<0.01) in carcass traits table 4. hot carcass weights and dressing percentage at age 35d,treatment (3,2) recorded the highest value hot in carcass weights 1494.17g,1473.8 g, also in dressing percentages without edibles 70.58 ,

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69.91% respectively ,while the lowest value recorded in control group(T1:contained corn as a sole source of grain) 1205.17g,65.50 %.Also T3 recorded lowest significant value (P<0.05) in relative weight of heart 0.56 Vs. the highest value in all treatments, the same trend in relative gizzard weight and abdominal fat. The carcass cuts appears no significant differences among T3,T2 Vs. T1 (control group) in main cuts (thigh ,breast),while T3,T2 recorded the lowest significant percent in secondary cuts ,the averages were 17.33% back cut Vs. 18.89% in (control group),but in wings cut (T4) recorded the highest value10.36% between all treatments, also T3 recorded the lowest significant value in length of intestinal and Relative intestinal length179.66cm, 8.65%,while the largest values recorded in T2.T5,T4 : 204.16, 202.0, 199.33cm respectively ,and the largest value in relative intestinal length was 11.55% in T5(50% corn +50% millet soaked in acetic acid).

The rates of dressing ratio appear to be consistent with the live weights of birds. Pandurevic and Lalovic (2014) show that there is a strong correlation coefficient between the average weight before slaughter and the dressing ratio, which reached 0.7 in males and females, 0.89.The results of the present study agreed with the findings of the researcher Kokoszynski et al (2017) who observed a low correlation coefficient (0.3 = r) between average body weight and internal viscera weight. The moral and computational superiority may be due to the eighth treatment (millet soaked with citric acid + millet soaked with acetic acid) To the improvement in the readiness of the nutrients that stimulate growth and thus the presence of surplus quantities of the bird's need, which led to an increase in its deposition inside the bird's body (Areer, 2013, Nasibeh, et al,2016)

Table 4. Dressing percentage , edibles , Abdominal fat.

Treatments ± SEM							
Treatment No	Live B.W (g)	Hot carcass. Weight (g)	% Dressing Without edible	% Heart	% Liver	% Gizzard	% Abdominal fat
T1*	d 1840.0 ± 0.00	c 1205.17 ± 5.86	c 65.50 ± 0.33	a 0.67 ± 0.00	bc 2.60 ± 0.02	a 2.82 ± 0.07	c 1.20 ± 0.08
T2	b 2095.0 ± 5.00	a 1473.83 ± 3.71	a 69.91 ± 0.33	abc 0.63 ± 0.02	a 2.81 ± 0.06	d 2.13 ± 0.02	c 1.20 ± 0.04
T3	ab 2107.5 ± 11.81	a 1494.17 ± 8.35	a 70.58 ± 0.76	c 0.56 ± 0.03	bcd 2.50 ± 0.10	cd 2.18 ± 0.05	d 1.01 ± 0.02
T4	c 1936.3 ± 9.94	b 1330.50 ± 10.78	b 67.74 ± 0.84	ab 0.64 ± 0.02	bc 2.58 ± 0.03	c 2.31 ± 0.04	b 1.29 ± 0.01
T5	d 1847.7 ± 14.67	d 1231.33 ± 7.67	bc 66.58 ± 0.27	a 0.67 ± 0.01	ab 2.72 ± 0.11	b 2.59 ± 0.10	a 1.43 ± 0.07
Significant	**	**	**	*	**	**	**

*T1(corn only),T2(normal millet only),T3(millet only soaked in acetic acid),T4(50%corn+50% normal millet),T5(50%corn+50% soaked millet)

a ,b ,c Means bearing different superscript in a column differ significantly **(P<0.0l), *(P<0.05)

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Table 5. Carcass cuts and Intestinal morphological

Treatment .No	% Thigh	% Breast	% Back	% Wings	Small Intestinal. Length(cm)	Relative intestinal length.cm / g
T1*	28.89^{a} ± 0.29	34.99^{bc} ± 0.30	18.89^{b} ± 0.17	9.70^{cd} ± 0.05	193.50^{b} ± 2.08	10.89^{b} ± 0.21
T2	28.48^{a} ± 0.42	36.77^{ab} ± 0.49	17.97^{bc} ± 0.04	9.94^{c} ± 0.02	204.16^{a} ± 0.44	9.78^{c} ± 0.01
T3	29.03^{a} ± 0.02	37.14^{a} ± 0.12	17.33^{c} ± 0.13	9.49^{d} ± 0.11	179.66^{c} ± 0.16	8.65^{d} ± 0.03
T4	27.67^{ab} ± 0.71	37.31^{a} ± 0.69	19.10^{a} ± 0.29	10.36^{a} ± 0.07	199.33^{a} ± 3.46	10.66^{b} ± 0.35
T5	25.58^{b} ± 3.16	35.02^{bc} ± 0.89	17.3^{bc} ± 0.18	10.07^{b} ± 0.05	202.0^{a} ± 1.60	11.55^{a} ± 0.05
Significant	*	*	**	**	**	**

*T1(corn only),T2(normal millet only),T3(millet only soaked in acetic acid),T4(50%corn+50% normal millet),T5(50%corn+50% soaked millet)

^{a,b,c} Means bearing different superscript in a column differ significantly **(P<0.0l), *(P<0.05)

The economics of replacing maize with pearl millet in broiler diets:

Table 6.show the cost difference between soy-corn and soy-millet diets between all treatments,the cheapest treatment were T2(100%pearl millet),T3(100% pearl millet soaked in acetic acid) which recorded different in cost of diets at average 26.5.10.1 dollars /ton diet compromised with control treatment,T1(contained 100% corn),this results under conditions of Iraq poultry industry mean excellent in the feed industry in Iraq.

Table.6 economical returns

Treatments	**T1**	**T2**	**T3**	**T4**	**T5**
Cost of feed /kg in starter period(USA dollars)	490.0	387.0	388.0	439.0	439.5
FCR in starter period	1.31	1.35	1.34	1.56	1.59
Total cost for weight gain unit in starter period(USA dollars)	641.9	522.4	520.0	684.8	698.8
Cost of feed /kg in finisher period(USA dollars)	467.8	313.4	314.0	420.0	421.0
FCR in finisher period	1.43	1.5	1.6	1.47	1.54
Total cost for one weight gain in finisher period(USA dollars)	669.0	470.0	502.4	617.4	648.3
Total cost (starter + finisher) in USA dollars	1136.8	835.8	1022.4	1302.2	1347.1
% control cost in USA dollars	100	73.5	89.9	114.5	118.4
Cost difference (USA dollars)	0	-26.5	-10.1	+14.5	+18.4

*T1(corn only),T2(normal millet only),T3(millet only soaked in acetic acid),T4(50%corn+50% normal millet),T5(50%corn+50% soaked millet).

Conclusion and Recommendations

The possibility of partially or completely replacing millet with the yellow corn in a broiler diet being better than Yellow corn crop, The possibility of soaking millet with acetic acid to improve its nutritional value The process of soaking millet with acetic acid reduced the

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effect of nutritional inhibitors. Especially tannin and phenols High palatability of the diets due to the presence of a relatively sour taste in it. The cost of one ton of local Iraqi pearl millet is 276 $/ton compromised with imported yellow corn is 448$/ton,So the cost of locally millet is equivalent to 60% of the cost of yellow corn Significant difference in economic cost, as the diets containing millet were less about 26.5% per ton than the diets of imported yellow corn**.**

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