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EFFECT OF TYPE OF LITTER AND DIETARY MOLASSES SUPPLEMENTATION ON SOME DANDARAWI CHICK TRAITS UNDER SUMMER SEASON CONDITIONS OF ASSIUT GOVERNORATE

By

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Abstract: *Six hundred and thirty of 8 weeks of age Dandarawi chicks were used to study the effect of type of litter and dietary molasses supplementation on the performance, carcass parts, and economic efficiency during growth period under summer season conditions of Assiut governorate. All chicks were housed in floor pens in 3 equal groups (3 replicates of 70 birds each). Each replicate was kept in a partition of 10 square meters provided with light litter (5 cm). In group 1 which served as control one, the chicks reared on wheat straw litter (WS), while the other 2 and 3 groups reared on wheat straw litter or sand with 4% molasses supplementation to the diet (WSM and SM, respectively). The photoperiod was 12 hours per day and light intensity ranged from 20 to 25 Luxes, while feed and water were available all the time. The chicks received grower diet until 20 weeks of age. The indoor temperature and humidity ranged between from 25-38°C and 40-66%, respectively.*

The obtained results could be summarized as follows:

The birds reared on SM had significantly ($P \leq 0.05$) heavier body weight (BW) and daily weight gain (BWG) and it also observed that the overall mean of feed consumption (FC) decreased ($P \leq 0.05$) than those of WS and WSM. The birds reared on SM showed improved ($P \leq 0.05$) feed conversion ration (FCR) than those of WS, while WSM group had an intermediate estimate. The birds of SM and WSM groups had significantly ($P \leq 0.05$) heaviest the percentages of carcass and liver as compared to the birds of WS group. The birds of group SM had significantly ($P \leq 0.05$) lower percentages of feet and shank, head, heart, gizzard and proventriculus than those of WS and WSM groups, it also showed significantly ($P \leq 0.05$) higher carcass weight and tibia bone length and diameter than those of WS and WSM groups. The birds reared on SM and WSM exceeded in WS control the economical efficiency by 17 and 21%, respectively. In general, sand

with 4% molasses supplementation to diet has shown good potential as alternative wheat straw with or without 4% molasses supplementation to diet for growing Dandarawi birds during high environmental temperature of summer season in Assiut governorate.

INTRODUCTION

The low resistance to heat stress in the hot climate is a major limiting factor and a big problem for birds reared in tropical and subtropical regions. High ambient temperature as encountered in Egypt and many other countries, during the summer can generate a state of stress and evokes a combination of behavioral, biochemical and physiological changes causing a reduction in birds performance.

High environmental temperature has deleterious effects on the young chickens (Henken et al., 1983). The adverse effects of chronic heat stress on grow-out performance are characterized by lowering growth rate, feed intake and feed conversion (Cahaner and Leenstra, 1992, Geraert et al., 1996 and EL-Deeb and Abou-Elmaged, 2001). Also, Dawoud (1998) reported that low growth occurred in summer season by high ambient temperature (30-36°C) which has a direct effect on central nervous system by reducing metabolic rate and feed consumption.

The potential of sand as a material for rearing broiler chickens was recently reported by Bilgili et al., (1999a). Where, the positive responses were observed in favor as sand in terms of body weight and litter microbiological quality. Previous research has shown that using sand as litter can help broilers producers to reduce pollution, improve production, lowering costs (El-Sagheer et al., 2004).

It is known that, diets for poultry are considered to be high energy. Therefore, cereal grains and supplemental fats are normally used in some countries to supply the bulk of calories need to broilers, turkey, and laying hens. In Egypt and many countries use the available other sources of energy such as molasses at an economical cost. Where it is a by-product to sugar production and contains 20-30% water, hence it is much lower energy than the cereal grains. This represents about 70% of the corn energy (Waldroup, 1981). Molasses can be used at 3 to 5% in the feed to improve the palatability and feed intake, reduce dustiness and as a source of potassium to face heat stress symptoms (Narahari, 2004).

However, little work has been done to determine the effect of type of litter and dietary molasses supplementation on alleviating the deleterious effects of high environmental temperature on growing Dandarawi chicks performance. Therefore, the objective of the present study was to determine the ability of litter type and molasses supplementation to prevent the negative effects of high environmental temperature on Dandarawi chicks performance during growth period.

MATERIALS AND METHODS

The present work was carried out at the Research Poultry Farm of Animal and Poultry Production Department, Faculty of Agriculture, Assiut University, Assiut, Egypt. The experiment was made during summer season (from 8th of May to 8th of August 2005), where the environmental temperature ranged between 25 °C at night to 38 °C afternoon while, humidity was from 40 to 66% (Tables 2 and 3). Six hundred and thirty at 8 weeks of age Dandarawi chicks (315 males and 315 females) were used in this study. All birds were weighed, and housed in 3 floor pens groups where each one of 3 replicates of 70 birds (35 males and 35 females). Each replicate was kept in a partition of 10 square meters provided with light litter (5 cm). The first group served as control one, where the chicks reared on wheat straw litter (WS) while, the other 2 and 3 groups the chicks reared on wheat straw litter or sand both with 4% molasses supplementation to the diet (WSM and SM, respectively). The photoperiod was 12 hours per day (8 a.m. to 6 p.m.) and light intensity ranged from 20 to 25 Luxes while feed and water were available all the time where chicks received grower diet until 20 weeks of age. The indoor temperature (°C) and humidity (%) was daily recorded every 3 hours during the experimental period and then the average minimum and maximum indoor temperatures and humidity were biweekly calculated, as shown in Tables 2 and 3. The composition and calculated analysis of the experimental diets are shown in Table 1.

Body weight ***(BW)*** and *feed consumption* ***(FC)*** were estimated where birds of each replicate were individually weighed every 2 weeks and FC was recorded weekly and calculated periodically every 2 weeks. *Feed conversion ratio* ***(FCR)*** (g feed/ g gain) was weekly calculated by dividing total feed consumed every 2 weeks (g/d/h) in a pen by the total weight gain (g/d/h) of its birds. At the end of the experiment (at 20 weeks of age), 18 birds (9 males and 9 females) per group (3 males and 3 females from each replicate) were randomly chosen and slaughtered. Where, the internal organs were removed while the heart, liver, empty gizzard, proventriculus, spleen and empty gastrointestinal tract including the pancreas were weighed. Each of head at the occipital bone, feet and shanks at the hock joints, wings at shoulder joints, neck close to the shoulder, breast, femurs and drumsticks were weighed as separate carcass parts and back were weighed. Each of carcass weight, feet and shank, head, neck, drumsticks, femurs, drumsticks and femurs, breast, wings and back were calculated as percentages of pre-slaughter live body weight, while each of heart, liver, gizzard, giblets, proventriculus, spleen, gallbladder and intestine were calculated as percentages of carcass weight.

Economical efficiency (EE): Feed cost per bird was calculated by multiplying mean FC per bird by the cost of 1 kg of diet. Bird price was calculated by multiplying mean bird weight by price of 1 kg of live weight. Net revenue was calculated by subtracting bird price from total feed costs. Economical efficiency (EE) was estimated by dividing net revenue by total feed costs.

Statistical analysis: Data collected were subjected to ANOVA by applying the General Linear Models Procedure of SAS software (SAS institute, version 6.12, 1996). Duncan (1955) was used to detect differences among means of different groups.

RESULTS AND DISCUSION

1. Body weight (BW):

The birds of SM group had significantly ($P \leq 0.05$) higher BW than those of WS and WSM groups at all ages studied (Table 4), while birds of WSM had had significantly ($P \leq 0.05$) higher BW than those of WS group (Figure 1). It was also observed that, body weight at 20 weeks of age of SM group was significantly ($P \leq 0.05$) higher by about 19.1 and 8.5% than those of WS and WSM groups, respectively while WSM group had significantly ($P \leq 0.05$) higher BW by about 11.7% than those of WS group.

El-Sagheer *et al.,* (2004) reported that broilers reared on sand litter had the heaviest body weights ($P \leq 0.05$) as compared with those reared on wheat straw or saw dust. Bilgili *et al.,* (1999a) found that broilers reared on sand litter had significantly ($P \leq 0.05$) greater body weights than those reared on pine shavings. Malone *et al.,* (1983) illustrated that the body weight differences may be attributed to feed intake depression which associated with litter consumption in birds reared on pine shavings. In contrast, Oliveria *et al.,* (1974) observed that types of litter had no significant effect on growth rate of broilers.

Narahari (2004) reported that molasses can be used at 3 to 5% in the feed to improve the palatability and feed intake, reduce dustiness and a source of potassium which control heat stress symptoms. The most vital physiological responses of broiler chicks to heat stress are elevating body temperature, panting and alkalosis of blood (Teeter *et al.,* 1985), high urinary excretion and high mineral loss (Pardue *et al.,* 1985 and Wideman *et* *al.,* 1994). It would be suggested that the supplementation of broiler chicks with high K might alleviate the effect of heat stress on these physiological responses (Ait-Boulashen *et al.,* 1995; Teeter and Smith, 1986; Deyhim and Teeter, 1991; Reece *et al,* 2000). Potassium (K), the most abundant intracellular cation, is involved in many metabolic and physiological processes including nerve conduction, excitation-contraction in muscle cells, and regulation of cell volume (Ait-Boulashen *et al.,* 1995). Teeter and Smith (1986) suggested that blood pH and K were dependent factors therefore this dependency associated with the opposite movements of K and hydrogen (H) ions into and out of cells (Tobin, 1958). Supplemental potassium chloride (KCl) increased water intake (Belay and Teeter, 1993) and plasma K (Reece *et al.,* 2000).

2. Body weight gain (BWG):

The birds of SM group significantly gained ($P \leq 0.05$) more than those of WS and WSM groups at 10, 12, and 14 weeks of age, respectively while the birds of WSM group significantly gained ($P \leq 0.05$) more than those of WS group (Table 5). At 16 and 18 weeks of age, the birds of SM and WSM groups significantly gained ($P \leq 0.05$) more than those of WS group, but no significant differences were found between WSM and SM groups. At 20 weeks of age, the birds reared on SM showed a significantly ($P \leq 0.05$) higher daily weight gain than those reared on WS and WSM, while no significant differences were found between WS and WSM groups. However, the overall mean of SM group showed a significantly ($P \leq 0.05$) higher daily weight gain than those of WS and WSM groups by about 24.7 and 8.9% respectively, while the birds of WSM group showed significantly ($P \leq 0.05$) higher by about 17.3% than those of WS group.

El-Sagheer *et al.,* (2004) showed that the broilers reared on sand or wheat straw or sawdust had no effect on body weight gain, similarly to Oliveria *et al.,* (1974), in white leghorn broilers, Shanmugasundaram *et al.,* (1977) in broilers and Sharma (1987) in white leghorn.

3. Feed consumption (FC):

At 10 and 14 weeks of age, no significant differences were found in FC among all groups (Table 6). However, at 12 weeks of age the birds of WS group consumed significantly ($P \leq 0.05$) more feed than WSM group, but the birds of SM group had an intermediate estimate. At 16 weeks of age, the birds of SM group consumed significantly ($P \leq 0.05$) more feed than the birds in WS and WSM groups, while WSM group consumed significantly ($P \leq 0.05$) more feed than WS group. At 18 and 20 weeks of age, the birds of SM group consumed significantly ($P \leq 0.05$) more feed than the birds in WS and WSM groups, while differences between WS and WSM groups were not significant. The overall mean of FC in SM groups were increased significantly (P≤0.05) by about 8.3 and 7.0%, respectively as compared with that of WS and WSM groups, while no significant differences between WS and WSM groups were observed.

Lien *et al*., (1992), Martinez and Gernat (1995) and Bilgili *et al.,* (1999a) reported that broilers reared on sand litter had significantly greater (P≤0.05) feed consumption than birds reared on pine shavings. In contrast, El-Sagheer *et al.,* (2004) showed that the broilers reared on sand or wheat straw or sawdust had no effect on feed consumption.

Narahari, (2004) reported that molasses supplementation at 3 to 5% to diet improved the palatability and feed intake. Increasing the amount of molasses in the diet cause a greater intake of water (Winter, 1929). Ott *et al.,* (1942) reported that fed female chicks to 24 weeks and males to 14 weeks of age on diets up 6% molasses increased significantly (P≤0.05) total feed intake, formerly observed by Upp (1937).

4. Feed conversion ratio (FCR):

The birds of SM and WSM groups had significantly (P≤0.05) better FCR than those of WS group at all ages studied except that insignificant ones at 16 weeks of age (Table 7). It was observed that, the birds of SM group had significantly (P≤0.05) better cumulative FCR by about 25.8% than that those of WS group, but the birds of WSM group had an intermediate estimate.

Bilgili *et al.,* (1999a) reported that broilers reared on sand litter or pine shavings had no effect on feed conversion ratio. Oliveria *et al.,* (1974) observed that types of litter had no significant effect on feed conversion ratio of broilers. Halloran (1965a,b) and Soldevila *et al.,* (1970) reported that chicks fed 2.5 or 5% of molasses had small improvement in feed conversion ratio. In contrast, Upp (1937) observed that lower feed efficiency of chicks with diets containing molasses.

5. Carcass criteria:

No significant differences in the percentages of carcass yield were found among all groups. The birds of WSM and SM groups had significantly (P≤0.05) highest carcass percentage as compared to the birds of WS group (Table 8). The birds of group SM had significantly (P≤0.05) lower percentages of feed & shank and head than those of WS and WSM groups.

It was found that type of litter and molasses supplementation had no significant effect on percentages of spleen, gallbladder and intestine (Table 9). The birds of SM group had significantly ($P\leq0.05$) higher carcass weight, tibia bone length and tibia bone diameter than those of WS and WSM groups. The birds of SM group had significantly ($P\leq0.05$) lower percentages of heart, gizzard and proventriculus than the birds of WS and WSM groups, however, the birds of SM and WSM groups had significantly ($P\leq0.05$) higher percentage of liver than the birds of WS group. The birds of WSM group had significantly ($P\leq0.05$) higher percentage of goblets than those of SM group, while the WS group had an intermittent value.

Bilgili *et al.,* (1999b) reported that the broilers reared on sand litter had significantly ($P\leq0.05$) lower gizzard than those reared on pine shavings. Willis *et al*., (1997) found that there were no significant differences in carcass weight and carcass yield percentage between broilers reared on pine shavings, leaves and those reared on mix of 50% leaves and 50% pine shavings. Lien *et al*., (1992) found that litter type, recycled paper chips and pine shavings had no significant effects on carcass yields of broiler chickens.

6. Economical efficiency (EE):

Results in Table 10 indicate that the birds of SM had heavier body weights than those of WS and WSM groups. Also, birds of SM consumed more feed, thus it had the highest feed cost. The WSM and SM groups were superior in net revenue per bird compared to WS control group. SM and WSM groups exceeded the economical efficiency by 17 and 21%, respectively compared with control group (WS). The SM group recorded the best EE value as compared with the WSM group. El-Sagheer *et al.,* (2004) reported that the boilers reared on sand litter had the best economical efficiency value as compared with those reared on wheat straw or sawdust.

CONCLUSION

From obtained the results in this experiment, it may be concluded that the Dandarawi chicks during growth period reared on sand or wheat straw with 4% molasses supplementation to the diet during environmental temperature had greater BW and BWG. It also decreased FC and showed more economically efficient than the rearing on wheat straw with or without molasses supplementation. Moreover, the Dandarawi chicks reared on wheat straw with 4% molasses supplementation to the diet had greater BW, BWG and more economically efficient than those reared birds on wheat straw.

Table 1. Composition and calculated analyses of experimental diets.

Ingredients (%)	Starter (0-8 weeks)	Wheat Straw	Wheat Straw + molasses and Sand + Molasses
		Grower (9-20 weeks)	
Yellow corn	62.10	71.40	69.60
Wheat bran	1.25	1.05	2.85
Soybean meal, 44% CP,	28.90	19.70	19.70
Salt	0.25	0.25	0.25
Limestone	1.50	1.70	1.70
Dicalcium Phosphate	1.70	1.60	1.60
Vit & Min. Premix*	0.30	0.30	0.30
Sand	4.00	4.00	--
Molasses	--	--	4.00
Calculated analysis:			
ME, Kcal/ Kg	2812.00	2928.00	2951.00
Crude protein, %	18.40	15.10	15.30
Crude fiber, %	3.60	3.10	3.25
Fat, %	2.64	2.90	2.92
Lysine, %	1.00	0.75	0.75
Methionine, %	0.31	0.30	0.29
Met+Cys,%	0.64	0.54	0.54
Total calcium,%	1.03	1.06	1.09
Available phosphorus,%	0.45	0.42	0.42
Cost/kg diet P.T. (Local price of year 2005)	**1.27**	**1.18**	**1.20**

*Vitamins and minerals premix provided per kilogram of the diet: Vit A (as all-transretinyl acetate), 12000 IU; D_3, 2200 ICU; Vit E (all rac-α-tocopheryl acetate), 10 mg; Vit K_3, 3 mg; B_2, 10 mg; Pantothenic avid, 10 mg; Niacin, 20mg; Vit B_{12}, 10µg; Vit B_6, 1.5 mg; thiamine (as thiamine mononitrate), 2.2 mg; Folic acid, 1 mg; D-biotin, 50 µg; Chlorine chloride, 500 mg; copper, 10mg; iron, 30 mg; Manganese, 55 mg; Zinc, 50 mg, selenium, and 0.1 mg, Ethoxyquin, 3mg.

Table 2. Minimum and maximum (X±SE) of indoor temperatures (°C) during the experimental period.

Intervals (in weeks)	Wheat Straw			Wheat Straw + Molasses			Sand + Molasses			± SE
	Av	Mi	Ma	Ave	Mi	Ma	Av	Mi	Ma	
10	28.1	25	32	28.0	25	32	28.2	25	32	0.2
12	29.5	25	34	29.5	25	34	29.4	25	34	0.2
14	31.6	26	35	31.6	26	35	31.8	26	35	0.2
16	32.5	29	36	32.6	28	36	32.6	28	38	0.2
18	33.0	28	36	33.1	28	35	33.1	28	36	0.2
20	32.5	30	36	32.4	29	35	32.3	28	35	0.2
Overall mean	**31.2**			**31.2**			**31.3**			**0.2**

Av= Arverage Mi= Minimum Ma= Maximum SE= Standard Error

Table 3. Minimum and maximum (X±SE) of indoor Humidity (%) during the experimental period.

Intervals (in weeks)	Wheat Straw			Wheat Straw + Molasses			Sand + Molasses			± SE
	Av	Mi	Ma	Ave	Mi	Ma	Av	Mi	Ma	
10	51.3	40	60	51.5	42	60	51.8	40	60	0.4
12	51.5	42	65	51.6	40	66	52.2	42	66	0.5
14	51.5	40	63	51.3	40	66	51.7	42	66	0.5
16	51.0	42	60	51.2	42	66	51.9	42	66	0.4
18	51.4	40	63	51.3	40	62	51.8	42	63	0.5
20	51.9	40	66	51.8	40	66	52.1	42	66	0.5
Overall mean	**51.4**			**51.5**			**51.9**			**0.2**

Av= Arverage Mi= Minimum Ma= Maximum SE= Standard Error

Table 4. Effect of type of litter and dietary molasses supplementation on body weight (g) of Dandarawi chicks during growth period.

Intervals (in weeks)	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
8	381.3± 5.9	372.7± 5.5	377.2± 5.9
10	512.9± 7.2 [c]	545.8± 7.1 [b]	570.0± 7.1 [a]
12	632.7± 8.6 [c]	672.1± 7.9 [b]	728.6± 8.1 [a]
14	730.3±12.5 [c]	786.1± 9.6 [b]	874.2±10.0 [a]
16	824.5±17.3 [c]	905.6±11.4 [b]	997.8±11.6 [a]
18	910.5±20.2 [c]	1016.8±15.4 [b]	1110.4± 12.4 [a]
20	982.8±24.3 [c]	1112.4±16.5 [b]	1215.2±13.4 [a]

[a-----c] Means ± standard error in the same row with different superscripts are significantly different ($P \leq 0.05$).

Table 5. Effect of type of litter and dietary molasses supplementation on body weight gain (g/bird/day) of Dandarawi chicks during growth period.

Intervals (in weeks)	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
10	9.40±0.30 [c]	12.37±0.31 [b]	13.77±0.30 [a]
12	7.96±0.28 [c]	9.15±0.24 [b]	11.19±0.24 [a]
14	6.68±0.26 [c]	8.18±0.22 [b]	10.11±0.28 [a]
16	6.16±0.29 [b]	7.91±0.19 [a]	8.45±0.21 [a]
18	5.66±0.23 [b]	1.20±0.20 [a]	7.75±0.18 [a]
20	5.57±0.26 [b]	5.97±0.18 [b]	7.11±0.13 [a]
Overall mean	7.45±0.14 [c]	9.01±0.14 [b]	9.89±0.13 [a]

[a-----c] Means ± standard error in the same row with different superscripts are significantly different (P≤ 0.05).

Table 6. Effect of type of litter and dietary molasses supplementation on feed consumption (g/bird/day) of Dandarawi chicks during growth period.

Intervals (in weeks)	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
10	37.9±0.8	37.4±0.6	37.7±0.7
12	40.1±0.3 [a]	39.4±0.2 [b]	39.8±0.3 [ab]
14	43.4±2.7	43.6±2.0	45.6±2.2
16	41.3±0.8 [c]	44.2±0.6 [b]	47.6±1.3 [a]
18	47.1±1.0 [b]	48.0±1.3 [b]	54.3±1.0 [a]
20	50.5±1.8 [b]	51.2±1.3 [b]	59.0±0.5 [a]
Overall mean	43.4±0.9 [b]	44.0±0.9 [b]	47.3±1.3 [a]

[a-----c] Means ± standard error in the same row with different superscripts are significantly different (P≤ 0.05).

Table 7. Effect of type of litter and dietary molasses supplementation on feed conversion ratio (Kg feed/ Kg gain) of Dandarawi chicks during growth period.

Intervals (in weeks)	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
10	4.24±0.55 ^{a}	3.02±0.02 ^{b}	2.73±0.05 ^{b}
12	5.37±0.43 ^{a}	4.30±0.08 ^{b}	3.56±0.19 ^{b}
14	6.79±0.11 ^{a}	5.33±0.11 ^{b}	4.53±0.39 ^{b}
16	7.47±0.52	5.59±0.16	5.78±0.77
18	9.23±0.57	8.69±2.51	7.06±0.54
20	9.97±0.26 ^{a}	8.83±0.34 ^{b}	8.29±0.38 ^{b}
Overall mean	7.18±0.51 ^{a}	5.96±0.63 ^{ab}	5.33±0.50 ^{b}

$^{a-----c}$ Means ± standard error in the same row with different superscripts are significantly different (P≤ 0.05).

Table 8. Effect of type of litter and dietary molasses supplementation on carcass yield and carcass parts weights as percentages of live body weight for Dandarawi chicks during growth period.

Item	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
Live body weight, (g)	751.1±33.5^{b}	771.7±36.4^{b}	1257.5±51.4^{a}
Carcass, (%)	65.7± 0.6^{b}	70.9± 0.1^{a}	70.1± 0.6^{a}
Feet & Shank, (%)	5.3± 0.2^{a}	5.3± 0.2^{a}	4.4± 0.1^{b}
Head, (%)	5.6± 0.2^{a}	6.2± 0.4^{a}	4.8± 0.4^{b}
Neck, (%)	7.1± 0.5^{a}	6.3± 0.3	6.7± 0.2
Drumsticks, (%)	10.4± 1.0	10.3± 0.2	11.9± 0.3
Femurs, (%)	10.0± 0.6	10.4± 0.7	11.8± 0.3
Drumsticks & Femurs,	20.5± 0.6	20.8± 0.9	23.7± 0.5
Breast, (%)	13.4± 0.9	12.8± 0.8	14.8± 0.7
Wings, (%)	9.3± 0.7	9.3± 0.3	8.4± 0.3
Back, (%)	14.7± 0.9	14.5± 0.3	14.0± 0.6

$^{a-----c}$ Means ± standard error in the same row with different superscripts are significantly different (P≤ 0.05).

Table 9. Effect of type of litter and dietary molasses supplementation on body organs weights as percentages of carcass weight for Dandarawi chicks during growth period.

Item	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
Carcass weight, (g)	488.70±32.90[b]	546.60±25.60[b]	890.80±34.70[a]
Body organs:			
Heart, (%)	0.86± 0.02[a]	0.82± 0.01[a]	0.74±
Liver, (%)	2.77± 0.06[b]	3.31± 0.10[a]	3.45± 0.12[a]
Gizzard, (%)	3.58± 0.27[a]	3.52± 0.23[a]	2.68±
Giblets, (%)	7.21±	7.65± 0.30[a]	6.87±
Proventriculus, (%)	0.84± 0.04[a]	0.77± 0.03[a]	0.66±
Spleen, (%)	0.58± 0.05	0.49± 0.02	0.51± 0.02
Gallbladder, (%)	0.35± 0.09	0.26± 0.02	0.29± 0.19
Intestine, (%)	8.81± 0.43	8.61± 0.50	7.71± 0.47
Tibia bone length, cm	10.40± 0.30	10.70± 0.20[b]	11.80± 0.30
Tibia bone diameter,	0.34± 0.02	0.33± 0.02[b]	0.42± 0.03

a-----c Means ± standard error in the same row with different superscripts are significantly different ($P \leq 0.05$).

Table 10. Effect of type of litter and dietary molasses supplementation on economical efficiency.

Item	Wheat Straw (WS)	Wheat Straw + Molasses (WSM)	Sand + Molasses (SM)
Price of 1 kg of grower diet, 2005	1.18	1.20	1.20
Total feed consumption (Kg)	3.65	3.70	3.97
Feed costs (LE)	4.30	4.44	4.77
Final bird weight (kg)	0.983	1.11	1.22
Bird price (LE)	9.83	11.12	12.15
Net revenue per bird	5.53	6.69	7.38
Economical efficiency	1.29	1.51	1.55
Relative economical efficiency (%)	100.00	117.00	121.00

Price of 1 kg of live body weight, 2005 = 10.00 LE. LE = Egyptian pound.

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الملخص العربي

تأثير نوع الفرشه واضافه المولاس غذائيا علي بعض صفات كتاكيت الدندراوي تحت ظروف فصل الصيف فى محافظه اسيوط

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أجريت هذه الدراسة على ستمائه وثلاثون كتكوتا من سلاله الدندراوي عند عمر ٨ اسابيع ، بغرض دراسه نوع الفرشه واضافه المولاس غذائيا علي الأداء الإنتاجي ، وأجزاء الذبيحه ، والكفاءه الاقتصاديه لكتاكيت الدندراوي اثناء فتره النمو تحت ظروف فصل الصيف فى محافظه اسيوط. وربيت كل الكتاكيت على الارض وقسمت الكتاكيت إلي ثلاثه مجاميع (مقارنة ، ٢ معاملتين)، و اشتملت كل مجموعه على ٣ مكررات بكل مكرره عدد ٧٠ كتكوتا.وربيت كل مكرره فى عشه ابعادها ١٠م٢ على فرشه خفيفه حوالى ٥ سم.استخدمت المجموعة الأولي كمجموعه مقارنه وتم تربيه كتاكيتها على فرشه من تبن القمح ، بينما تم تربيه المجموعتين الثانية والثالثه على فرشه من تبن القمح أو فرشه من الرمل مع اضافه المولاس بمعدل ٤% الى العليقه على التوالى.

وتم تعريض الكتاكيت لفتره اضاءه ١٢ ساعات فى اليوم ، وكثافه ضوئيه مداها من ٢٠-٢٥ لوكس ، وغذيت الكتاكيت على عليقه النامى حتى نهايه التجربه (٢٠ اسبوع) ، وكانت درجه الحراره الداخليه من ٢٥-٣٨ م٢ ، والرطوبه النسبيه الداخليه من ٤٠-٦٠%.

يمكن تلخيص النتائج المتحصل عليها كالتالي:

اظهرت الكتاكيت المرباة على فرشة من الرمل مع اضافه المولاس الى العليقه وزن جسم ومعدل زياده يوميه أعلى معنويا ($P\leq0.05$) ، ونقص فى كميه الغذاء المستهلك مقارنة بتلك المرباة على فرشة من تبن القمح ، أوتين الفمح مع اضافه المولاس الى العليقه.

ولقد وجد أن الكتاكيت المرباة على فرشة من الرمل مع اضافه المولاس الى العليقه لها كفاءة تحويل غذائي أفضل ($P\leq0.05$) من تلك المرباة على فرشة من تبن القمح بينما كانت كفاءة التحويل الغذائي للكتاكيت المرباة على فرشة من تبن القمح مع اضافه المولاس ١ات قيمه متوسطه بينهما.

كانت الكتاكيت المرباة على فرشة من الرمل أو التبن مع اضافه المولاس الى العليقه اعلى معنويا ($P\leq0.05$) فى نسبتى الذبيحه والكبد مقارنة بتلك المرباة على فرشة من تبن القمح.

اظهرت التربيه على فرشه من الرمل مع اضافه المولاس الى العليقه قله نسب اوزان كل من الاقدام والقصبه ، والقلب ، والقونصه ، والمعده الغديه معنويا ($P\leq0.05$) مقارنة بتلك المرباة على فرشة من تبن القمح ، أوتبن القمح مع اضافه المولاس الى العليقه.

ادت التربيه على الى فرشه من الرمل مع اضافه المولاس الى العليقه الى زياده وزن الذبيحه ، وطول وقطر عظمه الساق معنويا ($P\leq0.05$) مقارنة بتلك المرباة على فرشة من تبن القمح ، أوتبن القمح مع اضافه المولاس الى العليقه.

من دراسة الجدوى الاقتصادية وجد أن التربية على فرشة من الرمل أو التبن مع اضافه المولاس الى العليقه على الرمل كانت أكفأ اقتصادياً بحوالي١٧ ، و ٢١% على التوالى من التربية على فرشه من تبن القمح.

بصفه عامه نستخلص انه يمكن استبدال التربيه على فرشه من التبن لكتاكيت الدندراوي النامية أثناء ارتفاع درجه الحراره فى فصل الصيف بمحافظه اسيوط الى التربيه على فرشه من الرمل مع اضافه المولاس بمعدل ٤% الى العليقه.