Studies on 16-Week old chicks of Dandarawi and Leghorn

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ABSTRACT

Slaughter test was performed to find out carcass percent, loss of weight by different processes, effect of cooking on meat properties, and percent lean meat. Some regression equations were calculated to estimate live body weight of Dandarawi (as an upper-Egyptian chicks breed) - and leghorn (as a standard chicks breed) chicks by means of live body measurements or carcass percentages,and the opposite. Another regression equations were calculated to count moisture,protein, and water holding capacity of chicks meat from each other. Different morphological characteres of Dandarawi as crest appearance,existence and size of comb and wattles,feathering,and colour were discussed also.

INTRODUCTION

Dandarawi is an extinct upper Egyptian chickens breed. There are no enough available works in the literature about this breed.

Rizk and El-Ibiary (1960) cited that differences in body size were more accurately estimated by skeletal dimensions. Shank length was a good criterion of body size.

Rize and El-Ibiary (1960 a) had estimated highly significant,and positive high coefficient of correlations of 0.80, 0.87, & 0.85 between weight of edible parts (mean of three breeds : Fayoumi, Leghorn, & Rhode Island Red) and each of the shank length, Keel length,and body depth, respectively.

Flachowsky and Jeroch (1973) were found highly significant correlation coefficients for the relation ship between absolute weight at the end of fattening period and weight of carcass ready for roasting (r=0.94) or other usable carcass parts. The level of feeding did not exert a significant influence on the juice retaining capacity.

Abdelhamid (1982) was found correlation coefficients between live body weight (LBW) and breast depth : + 0.77 & + 0.84, LBW and breast width : + 0.51 & + 0.77, LBW and sternum length : + 0.73 & + 0.83, LBW and tibia length : + 0.84 & + 0.83, LBW and dressing weight : + 0.99 & + 0.99, LBW and liver weight : + 0.63 & + 0.82, and between LBW and giblets weight: + 0.87 & + 0.95 for Dandarawi and leghorn chicks of 16 - week old, respectively. The Author was found also positive correlation coefficients of + 0.54 and + 0.99 between meat moisture and meat protein of Dandarawi and Leghorn, respectively.

Abdelhamid (1982 a) was found negative correlation coefficients between meat water holding capacity percentage and meat moisture of - 0.90 for leghorn and between meat water holding capacity and meat protein of - 0.91 and - 0.76 for Dandarawi and leghorn chicks,

respectively.

The present study was aimed to estimate live body weight of chicks by means of one of live body measurements or carcass percentages. Relation ships between moisture, protein,and water holding capacity of chicks meat were also counted. Some mor phological, chemical and physical characteres were tested too.

MATERIALS AND METHODS

The chicks used in this experiment were of two breeds : Dandarawi & S.C. White leghorn. A total of 482 chicks were used : 242 Dandarawis and 240 leghorns. Chicks were divided into 4 groups, each group was subdivided into 3 replicates. They brooded in electric staring batteries for the first 8 weeks, then in intermediate batteries for the rest of the experimental period. They were fed ad. lib.rations which had 17, 20, 23, or 26 per cent protein, 3 per cent fibers, and the usual vitamin supplement.

At sixteen weeks of age, chicks were starved for 16 hours, body measurements were measured by a steel vernier caliper in centimeters to the nearset millimeter. Then different morphological characters were estimated. Presently they were Killed, feather picking and evisceration were both done by hand. The different body parts were weighed in grams, then samples of thigh and breast were taken to estimate water holding capacity (by pressing a weighted meat

sample between two filter papers with five Kilogrammes weight), and too for chemical analysis according to the AOAC (1965). Cooking test was carried out for cooking-loss estimation by 163°C for 20 minutes (broiled) according to Lees, 1968; in boiled water for 20 minutes (boiled); and by 250°C for 30 minutes (roasted).

Data was subjected to statistical analysis according to Sachs (1976).

RESULTS AND DISCUSSION

a - Some morphological studies on Dandarawi chicks:

Dandarawi chicks haracterized with a crest for the wto sexes. Whether the effect of dietary protien level had no specific direction on the crest appearance, the lowest-and highest dietary protein levels (17 & 26 %) gave the highest percentages of crest clarity (as very clear). Generally the crest had appeared in 85 % of all of the tested chicks. The very clear crest was always the most frequent (circa twice, as percentages) in females than in males for all of the experimental dietary protein levels. Only 5% of the females were noticed without crest, those were fed ration of 20% protein, but 15.4% of the males were without crest, and those were from the different dietary protein levels(Table 1).

192 chicks (24/sex/dietary protein level) were tested at age of 16-week for existence and size of comb and wattles (Table 2). Increasing dietary protein level had affected the male comb negative. Generally, the male comb was sizeable (26.7%), middle

(64.0%), or absent (9.3%). Dandarawi male chicks had a cup type comb, they had also wattles. Dandarawi female chicks had no comb and wattles.

Feathering of Dandarawi chicks was late. Full feathering was not before 8.-10. week old. 100% of 192 Dandarawi chicks from the two sexes which fed the different experimental rations were full feathered at 16-week old.

100% of the tested Danarawi male chicks (96) had coloured black, except neck hackle and back were ever white. 95.4% from 96 Dandarawi female chicks were wheaten (but neck hackle, back, wing, and tail were darker than breast, Keel, and thigh which were pale) with some little of black feathers in wing and tail. The rest of the females (4.6%) were grey.

b- Live body measurements and carcass percentages as indicators for live body weight of Dandarawi-and leghorn chicks:

Table 3 summarizes live body weight and percentages of different parts of Dandarawi male chicks as mean (of thirty chicks) and standard error of each criterion.

Table 4 gives calculation of some regression equations for each of the two chick breeds Dandarawi and leghorn. Thereof it would be possible to calulate the body weight by Knowledge of one of the live body measurements (tibia length, breast depth, breast width & sternum length) or of the carcass percentages (dreessing, giblets, liver & feather), and contrarily i.e. it is possible to calculate one or more of the former mentioned

between brackets - measurements namely by means of the body weight declaration. These equations - and likewise other equations for the other breeds - are a good guide in control and estimation of body gain, chick performance, profitableness, and also in improvement of chick breeds. This is agree with the findings of Rizk and El-Ibiary (1960 a) on other breeds.

Turek et. al. (1966) determined the breast cross section (of different breeds) and breast longitudinal section from a selfdesigned apparatus. They found too the highest correlation-coefficients between breast cross section and amount of meat and between weight of legs and amount of bones.

C - Chemical contents and physical property of chick meat of Dandarawi and Leghorn:

It could be also calculated the chemical contents (% moisture and/or % protein) or the physical property (as water holding capacity percentage) of chick meat mutually, i.e. from each other, by means of the suitable regression equations (Table 4). That is useful in calcuation and estimation of chick meat quality.

Lean meat percentges of Dandarawi and leghorn were calculated in Table 5. These percentages were some what higher in the leg meat of males Dandarawi and leghern than in female chicks. The opposite was noticed in the breast meat of the two breeds i.e. females had given higher values than males, but with some exceptions. Table 6 presentes

some effects on meat properties and loss of weight of cooking and freezing of Dandarawi chick meat. The highest water holding capacity percentage was in fresh meat because of the water content. Differences were noticed between muscles, cooking type, and calculation method. Boiled breast and roasted leg gave the highest acidity. loss of weight by roasted meat was higher than by other cooking methods. Cooking of frozen chicks followed by loss of weight between 29 - 40% (from the weight before freezing) according to cooking method. The taste of roasted Dandarawi was the best then boiled and broiled.

Lawrie (1968) mentioned that the losses due to shrinkage on cooking will be greater since the high temperatures involved will cause protein denaturation and a considerable lowering in water - holding capacity. Moreover, some of the shrink or juice on cooking will represent non-aqueous fluid, since the high temperatures will melt fat and tend to destory the structures retaining it. Increasing temperature increase cooking loss, being due to loss of moisture. Thereupon, all differences observed for water holding capacity, acidity, and loss of weight by cooking due to method, time, and temperature of cooking.

REFERENCES

Abdelhamid, A.M. 1982. Effects on chick performance of low protein diet. 28th European meeting of meat research workers. Madrid. 5 - 10 September. pp : 7 - 14.

Abdelhamid, A.M. 1982 a. Effects of different dietary protein levels on some ingredients of blood, meat, and bone of 16-weeks old chickens. 28 th European meeting of meat research workers. Madrid. 5-10 September. pp : 15-20.

AOAC. 1965. Association of Official Agricultural Chemists. Official Methods of Analysis. 10 th Ed.

Flachowsky,G. und H. Jeroch. 1973. Der Einfluss eines variierenden Energie-und Rohp-roteingehaltes im Mischfutter auf die Ausschlachtungs-ergebnisse, die c-hemische Koerperzusammen-setzung und die Fleischqualitaet meannlicher und weiblicher Broiler. Arch. Tierernaeacher.,23.5.: 285 - 295.

Lawrie, R.A. 1968. Meat Science. Pergamon press. pp : 290 - 293.

Lees, R. 1968. the laboratory Handbook of Methods of Foof Analysis. Leonard Hill Books. London.

Pearson, D. 1962. The chemical analysis of food. J. & A. Churchill LTD. London. P : 304.

Rizk, Y. G. and H.M. El-Ibiary. 1960 Body size, feed efficiency, and mortlity rate in 16 week old Fayoumi chicks. Alex.J. of Agric. Res.,8,pp:65 - 82.

Rizk, Y.G. and H.M. El-Ibiary. 1960 a. Meat yield in the 16-week old Fagoumi, leghorn and Rhode Island Red shicks. Alex.J. of Agric. Res., 8,pp: 113-126.

Sachs,L. 1976. Statistische Methoden. Ein soforthelfer.3. Auflage. Springer-Verlag. Berlin Heidelberg.

Turek,F.,A. Haiger, F. Lettner und C. Schulz. 1966. Untersuchungen ueber die Abschaetzung der Fleisch-und Knochen^menge bein Masthuhn ohne Schlacht^koerperzerlegung. Arch.f. Geflue^gelk., 30. S : 401 - 420.

Table (1): Crest appearance percentage of 16-week old Dandarawi Chicks*

Crest clarity	Dietary Protein Level % 17		20		23		26	
	M.	F.	M.	F.	M.	F.	M.	F.
Very Clear	47.0	87.5	21.4	57.7	35.3	63.6	47.6	75.0
Clear	37.0	12.5	57.2	26.9	52.9	36.4	38.1	25.0
Absent	16.0	00.0	21.4	15.4	11.8	00.0	14.3	00.0

* n= 24 chicks/sex/dietary protein level (total number completed this test = 192).

M. = male F. = female

Table (2): Existence and size of comb of 16-week old Dandarawi male chicks as percentages*

Size of comb	Dietary Protein Level % 17	20	23	26
Sizeable	36.8	27.7	29.3	14.3
Middle	63.2	55.6	59.6	76.2
Absent	00.0	16.0	11.7	9.5

* = n completed these data = 96 male chicks.

Table 3 : Average percentages and standard error of different parts of Dandarawi male chicks at sixteen weeks of age (n=30).

Criterion	Mean ($\bar{x}$)	Standard error ($S_{\bar{x}}$)
Live body weight (g.)	1193.33	95.243
Total edible parts %*1	68.21	2.290
Blood %1	2.25	0.335
Feathers %1	5.84	0.880
Head %1	5.06	0.300
Legs %1	5.55	0.540
Neck %1	5.49	0.375
Gizzard (before opening) %1	3.27	0.235
Gizzard (empty-cleaned) %1	1.67	0.165
Liver %1	2.67	0.275
Giblets %**1	5.01	0.345
Breast %1	26.82	1.195
Thigh %1	33.75	4.010
Breast meat (boneless) %1	18.38	2.580
Thigh meat (boneless) %1	21.81	2.100
Breast bone %1	9.00	1.960
Thigh bone %1	9.70	1.590
Dressing %***1	65.92	1.525
Breast %2	41.52	0.915
Thigh %2	52.76	1.180
Breast meat (boneless) %2	25.94	2.875
Thigh meat (boneless) %2	31.81	0.999
Boneless meat %2	66.21	4.775

* = Percentages of dressed carcass plus giblets

1 = Percentages from live body weights

2 = Percentages from dressed weights

** = Percentages of liver, heart, gizzard and testis

*** = Percentages of carcass after bleading, picking the featthers, eviscerating and removing head and legs .

Table (4) : Regression equations for Dandarawi and leghorn chicks at the age of 16 - week (I)

Connection	Equation	
Body weight g. (x)/Tibia length cm.(y)	y=0.0149x - 5.4370	(+)
	y=0.0132x - 4.4075	(++)
Body weight g.(x)/Breast depth cm. (y)	y=0.0144x - 5.0673	(+)
	y=0.0190x -11.3783	(++)
Body weight g.(x)/Breast width cm. (y)	y=0.0030x - 1.5392	(+)
	y=0.0084x - 4.4754	(++)
Body weight g.(x)/sternum length cm.(y)	y=4.4319 + 0.0038x	(+)
	y=5.5340 + 0.0028x	(++)
Body weight g.(x)/Dressing percentage*(y)	y=69.4632 - 0.0054x	(+)
	y=140.1185 + 0.0250x	(++)
Body weight g.(x)/Giblets percentage**(y)	y=12.7000 - 0.0057x	(+)
	y=7.9550 - 0.0014x	(++)
Body weight g.(x)/Liver percentage (y)	y=11.0230 - 0.0079x	(+)
	y=3.8120 - 0.0011x	(++)
Body weight g.(x)/Feather percentage(y)	y=9.3200 - 0.0021x	(+)
	y=3.3550 + 0.0052x	(++)
Meat moisture %(x)/Meat protein %(y)	y=25.2130 x - 1756.7000	(+)
	y=84.9230 + 96.6700x	(++)
Meat moisture %(x)/Meat water holding capacity %(y)	y=462.7620 - 5.3190x	(+)
	y=7329.8490 - 98.7330x	(++)
Meat protein %(x)/Meat water holding capacity % (y)	y=412.0210 - 4.0110x	(+)
	y=410.0210 - 3.8940x	(++)

(I) = The number completed each test per breed was 96

(+) = For Dandarawis (++) = For Leghorns

(*) = After bleeding, dry-picking the feathers, eviscerating and removing head and legs.

(**) = Liver, heart and gizzard.

Table 5: Lean meat percentages* of slaughtered 16- week old Dandarawi and leghorn chicks (on fresh basis)

Breed	Muscle	Sex	Dietary Protein Level % 17	20	23	26
Dandarawi	Leg	Male	83.20	80.35	87.65	87.35
		Female	79.00	77.94	84.83	94.91
	Breast	Male	87.46	83.21	87.88	90.07
		Female	85.43	89.64	88.56	93.30
Leghorn	Leg	Male	86.60	84.95	86.07	85.30
		Female	85.97	84.49	85.18	83.57
	Breast	Male	92.01	94.99	91.00	92.75
		Female	91.37	93.28	94.79	93.46

* % Lean meat = $\frac{\text{Total meat nitrogen \% x 100}}{F}$ (According to Pearson, 1962 and Lees, 1968) Where F = 3.6 for the dark meat

= 3.9 for the breast.

Table 6: Effect of cooking and freezing on meat properties and loss of weight of slaughtered male chic of Dandarawi at sixteen weeks of age.

Criterion	Muxle	Fresh meat	Frozen meat	Roasted meat	Boiled meat	Broie meat
Water holding capacity% (1)	Breast	—	—	57.14	57.03	66.1
	Thigh	—	—	55.93	63.93	64.7
" " " (2)	Breast	94.04	—	87.21	87.52	75.8
	Thigh	93.51	—	85.74	88.35	85.2
Acidity as mg Oleic acid/ 100 g meat	Breast	—	—	74.30	503.0	178.
	Thigh	—	—	230.1	40.4	30.
" " " Lactic acid /100 g meat	Breast	—	—	23.7	160.5	57.
	Thigh	—	—	73.4	12.9	9.
% loss of weight (3)	Breast	—	—	——	3.51	17.
	Thigh	—	—	——	10.71	34.
	Whole	—	2.77 ±1.09	31.98 ± 3.41	20.83 ±13.87	22. ± 3.
% " " " by melting after freezing (3)	Whole	—	5.47± 1.95	——	—	
Testing Panel test for flavour (4)	Whole	—	—	Excellent	Good	Sat sfy

(1) $WHC\ \% = \frac{AM - 8.48}{M} \times 100$ Where: A = % Moisture
B = Wetnese area cm^2
M = Sample weight mg

(2) $WHC\ \% = \frac{W2}{W1} \times 100$ Where: W_2 = Sample weight after pressing with 5 Kgs.
W_1 = Initial sample weight before pressing

(3) % from pre cooking or processing.

(4) mean of ten taster (according to Lees, 1966)