Zagazig J.Agric. Res., Vol .31 No.(2) 2004 735-747

CHAIN-SPEED EFFECT ON POULTRY EGG-PRODUCTION IN FEEDING SYSTEM

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Received 10 / 12 / 2003 ***Accepted 13 / 1 / 2004***

ABSTRACT: This study aimed to realize the effect of chain speed in chain feeding poultry system and location of cages on the component of forage and production. Samples were taken from chicken nurture into three battery, each of them with different chain speed. Data were taken on four distance from the beginning to of line of feed , so a mechanical analysis for samples of forage were taken on distance of study and separated according to their size by riddles. By using *(spss)* programme, fitting curves were used to express the relation to indicated the best speed of the chain and distance (location of cage) .

Statisticals stuedies were conducted the significant of the effect of (speed and distance) on egg production number, egg weight and broken eggs number. The best speed for chain is 12 m/minute and the distance is 85 m. The speed to chain over than 12m/min is recommended to make further work. Since available speed of chain nowadays is 12 m/minute, it is necessary to make more industrial studies for Varity of chain types with different row material, and powers to obtain optimume efficiency.

INTRODUCTION

Average percentage of split feed was 0.81% with the chain feeder and 1.43% in the v- shaped trough (Janssen-Ajm , 1985) . The automatic flat-chain feeders were used for exploitation of free – choice of feeding between

concentrate and grain mixture more successful than a complete diet , or restricted choice . (Touson-R *et al.*, 1986) . In flat-chain system, birds at the beginning of the line consume some of the feed , reducing feed availability to birds at the end of the line . Individuals at the beginning of the line also have first chance at selecting large particles (Belyavin and Sharman , 1988) .

The pan feeders are more efficient in terms of improved growth rate, reduced feed intake and consequently better feed conversion of broilers than flat chain (Elson, 1986). For the nutrients of fat, Zn , P , Ca , and Cu there was a significant location (pl) and week effect , so that body weight increased as p increased (Grimes J.L. and W.C. Bridges, 1990). The percentage of metabolizable energy converted to egg production increased by 20% in chicken restricted food intake, as compared to birds fed. Restricted feeding also helps prevent excessive weight gain .

Although favor limiting feed intake of laying hens, they neglect the potential for significant dietary restriction to layers at the end of feeder lines. In feeder system where feed intake is restricted , feed is delivered to feeder lines only for the time necessary for feed to travel to birds at the end of the line . However , as feed passes down the line , birds located at the beginning of the line consume some of the feed , reducing feed availability to birds at the end of the line (Macleod and Shannon, 1978). Feeder speed and the time for hens on return lines waited for feed to arrive varied greatly among houses. Despot it to this variability, levels of cracked eggs were almost always greater on return than out bound lines (D.A. Roland, SR. and S.L. Paulus, 1984). The problem of birds selectively eating an ingredient with large particle size, and segregation of ingredients burring handling due to particle size. Difference would appear to be reduced if the diets are pelleted (Reece *et al.*, 1986) .

Egg is considered a source for animal protein which has highly nutritive value. Generally, the losses are about 7 - 8% of the total egg production between the producer and the consumer, because of eggshell weakness. This research aimed to realize the effect of speed of chain in flat-chain feeding system and location of cages on the component of forage and production.

MATERIAL AND METHODS

Experiments were conducted at three farms of egg production and the period of the experiments was 40 weeks in order to measure the effect of feeding methods on egg weight, the produced number of egg, and the number of broken eggs. Data were divided according to the production nature into four age stages .The first from (3 –10) weeks, second from (11–20) weeks, third from (21–30) weeks and the forth form (31– 40) weeks. The chain runs from the forage drive hopper found in the front of the battery to one side of the battery, until it reaches the end of the battery, then the chain returns from the other side to reach again the drive hopper, and soon cages (45cm x 30cm) in all systems contained five birds. Treatments consisted of birds on four distances (6.5 , 49 , 94.5 , 140.5 m) from the beginning line of feed. Samples of forage were taken on distances of (6.5, 49, 94.5, 140.5m) from the beginning of the feed line. A mechanical analysis for these samples of forage and their weight was done in these distances as the components of forage were separated according to their size by riddles (Their diagonals were 3.5, 2, 1.4, 0.71 mm). Under these two variables (distance, speed of chain) four measures were studied and included the weight of the chicken, egg weight, number of eggs produced, and number of broken eggs. Curve fitting was carried out which expresses the relation with the best fit. This curve is called approximate curve. The shape of the curve (model) is chosen according to the shape by which different points of the variable are distributed. This relationship can be represented by a mathematical formula that determines the type of the function. The curve that represents the function is near reality if the formula is formed by the way that comes near to variables data by using SPSS programme .

RESULTS AND DISCUSSION

To choose the proper condictions to operat the feeding system in the poultry farms, many experments were conducted and the results were discussed as follows.

In flat-chain feeding system, the change of sample component percentage at the chain speed of 4.8 m/minute was greater than at speed 9 m/minute and speed 12 m/minute.

By comparing all models, it is revealed that the best approximate curve for the relation between the speed of chain system and the number of egg production, egg weight, number of broken egg is the quadratic function. At the same time, the statistical significance was not stable for the relation between the speed of the chain and chicken weight at significant level 95 % until the third production stage, that was the cubic function.

Effect of distance and speed of chain on egg production :

From the table (1) , it is clear that the distance of the chain has no significant effect on both chicken weight and egg number in the first production stage , while as the statistical significant was stable at significant level 95 % for both egg weight and number in the following three stages and number of broken eggs .

The independent variables (speed and distance) had no significant effect on the chicken weight. So chicken weight were excluded from system assessment.

It was also clear that the first stage of life had no significant effect created by both the independent variables on both egg number and weight. So these evidences were excluded during making regression analysis by the quadratic function, and it will equal zero to identify the maximum value for both chain speed and distance fit for maximization egg weight and number, and reducing the broken egg number.

From the previous part, it was revealed that statistical significance was stable for the relationship of y_1 and its effect on x_1 , x_2 (distance and speed of chain) separately. Also, it revealed the stability of the two variables y_2 and y_3 according to the change in the independent variables x_1 and x_2. So regression relationships between y_1 , y_2 and y_3 were found as they are affected by the two independent variables (speed and distance). We chose a variable of original value model and their natural logarithm . This means that log or lin change was done and made more than one blend.

Multiple regression was done for all stages of production as one stage (as the significance existed of all stages separately). The model had the greatest value of R^2 and the high value of (F) or the standard error by regression. It was clear that the formula represent .

The relationships between distance of the feeding and speed of chain as independent variable and both the other dependent variables

1- Broken egg :-

Y_1= 39.79798683 – 0.139405379 X_1 - 5.425859559 Ln X_2

(S.E = 1.451)

(S.E = 0.0053)

(S.E = 0.6515)

(R^2 = 0.6107)

(F = 376.7982)

2- Egg number :-

Y_2 = 45.63061871 – 0.03787494 X_1 + 3.671274534 Ln X_2

(S.E = 2.2453)

(S.E = 0.0058)

(S.E = 1.0411)

(R^2 = 0.2493)

(F = 1.70074)

3- Egg weight :-

Y_3 = 56.66518107 – 0.683273329 X_1 + 0.342863954 Ln X_2

(S.E = 1.906)

(S.E = 0.0075)

(S.E = 0.922)

(R^2 = 0.342863)

(F = 365.632)

The relationships between the broken egg, egg number, and egg weight with chain speed and distance are given by equations (1), (2), and (3) respectively.

Effect of distance and speed of chain on egg production

From table (2) it was found that the chicken weight decreased by the decrease of the distance that the chain moved through the four stages .

The number of produced egg increased during the first two stages at the distance of the study . It was also found that this number was reduced at the last two stages by the increase of the distance of feed transportation chain from the beginning to the end of the feeding line because of the lack of nutritive needs of different elements.

The average of egg weight increased during the four stages at the distances of the study. It was also found that it decreased by the increase of the distance of feed transportation chain from the beginning to the end of the feeding line for all the productive stages .

The number of broken eggs weight increased during the four stages at the distance of the study. It was also found that the number of broken eggs decreased by the increase of the distance of feed transportation chain from the

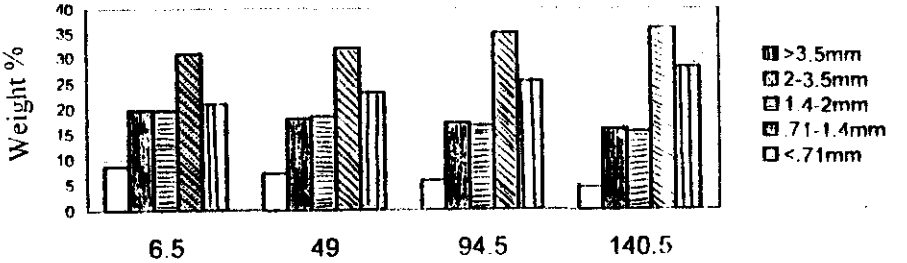

fig (1) The change of percentage samples components for speed 12m/min

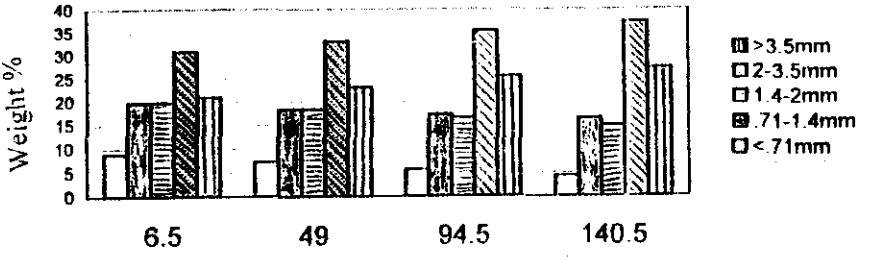

fig (2) The change of percentage samples components for speed 9m/min

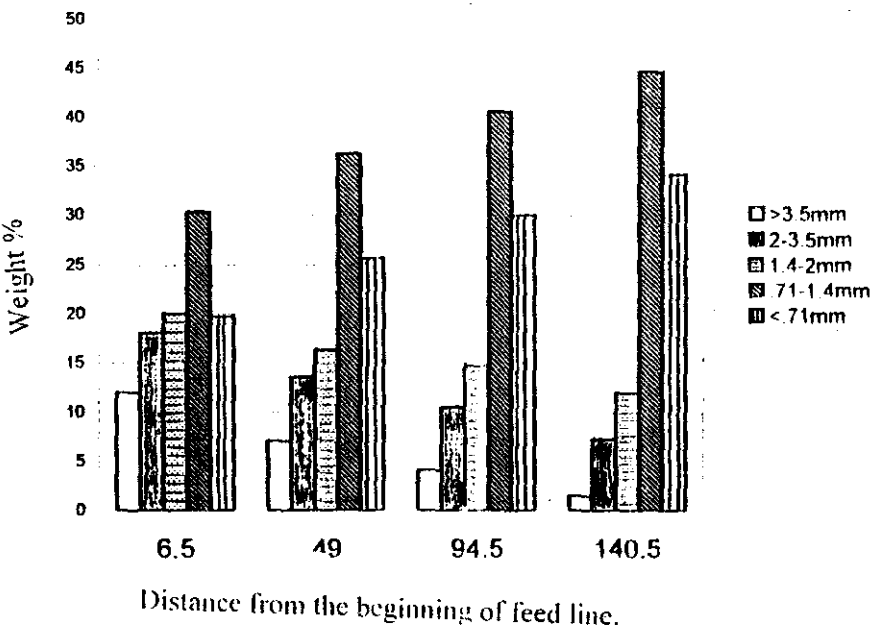

fig. (3) The change of percentage samples components for speed 4.8 m/min

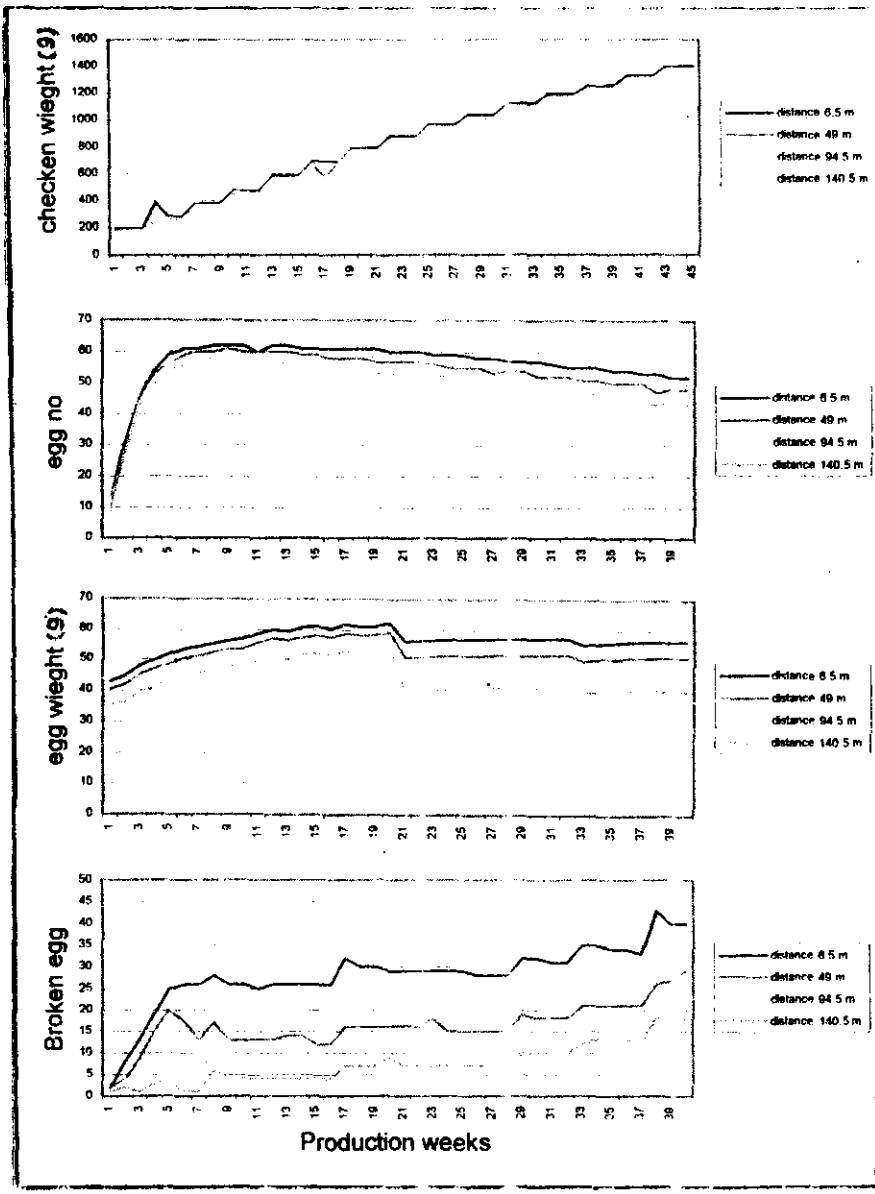

Fig (4) Relationship between distance of died and average egg weight, broken egg number egg production number and chicken weight for speed 12 m / minute.

Table (1) : Significance relationship between distance of chain as Independent variable and all the dependent variables according to the production stages .

d.v	No. production egg Y_1			Egg weight Y_2			No. broken egg Y_3			Chicken weight Y_4		
stages	R^2	F	Sign F	R^2	F	Sign F	R^2	F	Sign F	R^2	F	Sign F
First stage	7%	n.s 0.38	0.683	24.6%	* 19.14	0.000	6.7	* 4.19	0.017	10%	n.s 0.54	0.583
Second stage	6%	* 3.75	0.026	42.4%	* 43.12	0.000	10.5	* 6.87	0.002	2%	N.s 0.11	0.892
Third stage	15.8%	* 10.95	0.000	44%	* 45.95	0.000	10.1	* 6.59	0.002	17.3%	n.s 18.56	0.000
Forth stage	45%	* 47.93	0.000	16%	* 7.36	0.000	1.7	n.s 0.99	0.373	10%	n.s 0.11	0.893

Table (2) : Relation between distance of feeding and average of chicken weight, egg number , egg weight and broken egg number for speed 12 m /min.

Variable stages	Chicken mass (g)				Egg number			
	6.5m	49m	94.5m	140m	6.5m	49m	94.5m	140m
First st.	295	278.9	271.5	256.4	51	49	48	47
Second s.	582.2	564.9	568.4	560.3	61	59	57	54
Third st.	913.8	905.5	895.5	886.4	58	55	53	51
Forth st.	1258.8	1248.5	1238.9	1228.7	54	50	48	45

Table (2) Continous : Relation between distance of feeding and average of chicken weight, egg number, egg weight and broken egg number for speed 12 m/min.

Variable stages	Average of egg weight (g)				Broken egg number			
	6.5m	49m	94.5m	140m	6.5m	49m	94.5m	140m
First st.	51.4	48.5	45.6	42.8	20	12	7	2
Second s.	60.6	57.7	54.8	51.8	28	14	10	5
Third st.	56.8	51.5	46.2	40.9	29	16	12	8
Forth st.	59.3	53.9	48.6	43.3	36	22	18	14

beginning to the end of the feeding line. This was proven through the calculated values of the number of broken eggs at all the studied distances. This is because the increase of the nutritive elements from the egg shell (calcium and mineral salts) and responsible for the increase of its sickness, which in turn leads to the decrease of breaking rate.

it was found that the different measured values were not expressed by linear relationship.

The study recommends making farther work on speed of chain beyond 12 m/minute as fig (4),.

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تأثير سرعة الجنزير في أنظمة التغذية على إنتاجية بيض الدواجن

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لدراسة تأثير حركة جنزير نقل العلف في نظام التغذية بالجنزير وموقع القفص على مكونات العلف ، درجة تجانسها وإنتاجية الدجاج. تم تقسيم الدجاج على ثلاث بطاريات كلا منها بسرعة ثابتة للجنزير ، وأخذت القراءات على أربعة مسافات مختلفة بداية من خط التغذية إلى نهايته . وأجري تحليل ميكانيكي لعينات من العلف أخذت عند نفس المسافات ، وتم فصلها إلى أحجام مكوناتها بواسطة غرابيل . وباستخدام برنامج الـ (SPSS) تم عمل توفيق منحنيات لاختيار شكل الدالة المعبرة عن العلاقة بين السرعة والمسافة على العمليات الإنتاجية ، والتي أظهرت أن الدالة اللوغاريتمية هي المعبرة عن طبيعة العلاقة السابقة . وباستخدام أسلوب التحليل الرياضي تم تحديد المسافة والسرعة المثلي المحققة للكفاءة الفنية والاقتصادية . وثبتت المعنوية الإحصائية لتأثير السرعة والمسافة على كل من عدد البيض ، نسبة البيض المكسور ، ووزن البيض . وأظهر الأسلوب الرياضي أنه للحصول على أكثر كفاءة تشغيل لعملية التغذية يجب أن تكون سرعة الجنزير أعلى من ١٢متر/ الدقيقة على أن تكون المسافة ٨٥متر من بداية خط التغذية هى نهايته. وتوصي الدراسة بأن تتم دراسات تصنيعية لأنواع متعددة من الجنازير بخامات وقدرات مختلفة لتحقيق أعلى كفاءة اقتصادية .