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Research Paper

RELATIONSHIPS MEASUREMENTS AVERAGE WEIGHT IN BROILERS COBB 500 IN TWO FARMS OF THE CITY OF KORHOGO

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Abstract

A study was carried out in the commune of Korhogo with a view to evaluating the measurements as a function of the average weight in broilers of the cobb500 strain. To achieve this, two farms were studied in which the broilers were weighed and measured from the 1st day until the 35th day. The measurements concerned the weight, the length of the chicken, the height at the withers, the chest measurement, the length of the foot, the spout length and the length of the thigh. The results showed that the average weight went from 174.5 g to 1520 g for the broilers on farm 1 and from 290 g to 2400 g for those on farm 2 with a significant difference ($p < 0.05$) . As for the measures taken on the chickens, they made it possible to establish a link or not with the average weight. Among the 7 measurements studied, the spout length gave a weak correlation $r < 0.9$ while the other measurements gave a correlation $r > 0.9$. Apart from the spout length, there is a link between the other measurements and the average weight in broilers. Ultimately, farmers would benefit from using the measurements to set the price for firm edge broiler.

Key words: Measurements; Average weight; Broilers; Korhogo.

INTRODUCTION

Worldwide consumption of poultry meat has grown faster than that of other meats [6]. This increase finds its conjunction in several factors, in particular its low fat content, its very moderate price, its richness in proteins and its great efficiency in production technique [1]. In Ivory Coast, consumption of white meat has changed since the industrial production of broilers. From 0.43 kilogram / inhabitant / year (kg / inhabitant / year) in 2006, it rose to 1.99kg / inhabitant / year in 2015 according to the

Ivorian Poultry Interprofession [11]. The commercial circuits tend to diversify their offers in order to widen the choice of the consumer.

Poultry is a relatively inexpensive source. Their large-scale production is faster and less expensive than any other slaughter animal. It is experiencing renewed interest with the implementation of a policy to intensify the breeding of short-cycle species [14]. Raising broilers is an activity practiced in our different regions of the country. The presence of these chickens in a good number of households is justified by its economic and nutritional importance and by the consumer's taste for poultry products [10].

The marketing of broilers encounters difficulties in our regions, because the prices do not depend on the weight [13]. In addition, certain traders (customers) return to the farms of breeders to buy broilers at low prices without taking into account the conformation of the chickens. Thus, in the commune of Korhogo, the price of broilers is set randomly. This practice which was especially observed in traditional farms is nowadays also in modern farms, which does not have an advantage for breeders. Therefore, it would be a good idea to explore other methods to assess the cobb500 strain broiler chicken without using a scale.

The general objective is to estimate the average weight of a chicken of cobb500 strain by measurements.

MATERIAL AND METHODS

Study zone

Located between 8 ° 26 and 10 ° 18 north latitude and 5 ° 17 and 6 ° 19 west longitude, the department of Korhogo is located in the north of the Ivory Coast. Chief town of the Poro region then savannah district, it is limited to the North, by the department of M'bengue, to the North-east by the department of Sinématiali, to the South-east by the department of Niakaramadougou, to the South by the department of Dikodougou and to the west by the department of Boundiali. The department of Korhogo covers an area of 12,500 km2 with accessibility by road and air. The farms in which our work was carried out are located in the districts of South Koko and Belleville in the commune of Korhogo [18].

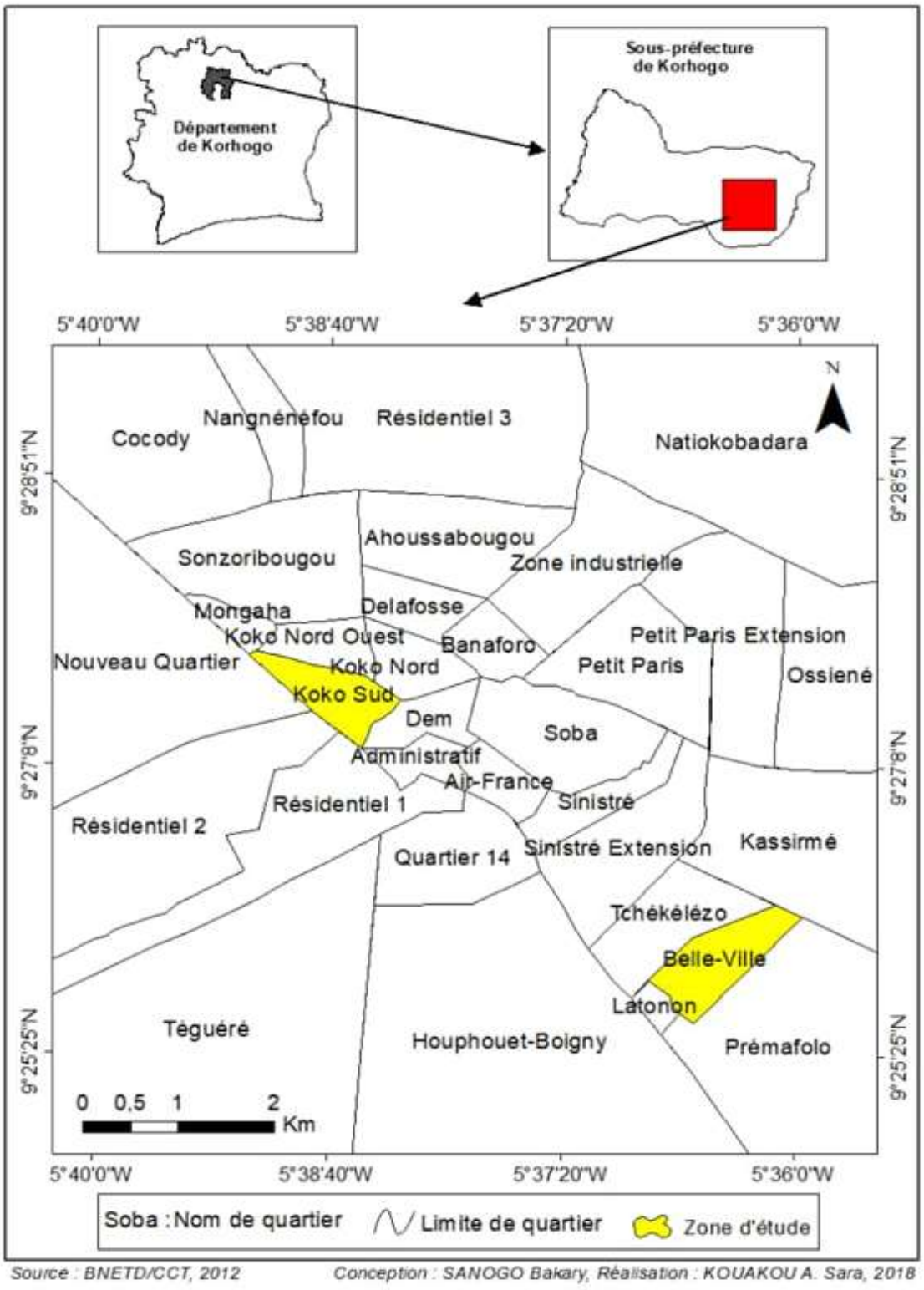

Figure 1: Map of the commune of Korhogo [18]

Biological material

The animal biological material consists of broiler chicks chosen from farms in the commune of Korhogo. These chickens have a 45-day growth, white plumage, an undeveloped crest with two red barbels, yellow legs and a yellow beak. A sample of 10 broilers chosen at random from two farms made it possible to carry out the work.

Weighing and Measurements

The broilers chosen were identified on arrival differently with markers. The weights and the different measurements were taken each week before the feed was distributed at 6 o'clock. The weight gain was made with a Pascal balance weighing 5kg before the measurements of the different parts of the body of the broiler. The different parts measured were the length of the foot, the length of the chicken, the height at the withers, the circumference of the chest, the length of the thigh and the beak. In addition, the measurement of the different parts of each of the 10 subjects was done individually with the meter. The measurement started from zero graduation until the length of the measured part is found. The method of identifying subjects is presented in Table 1.

Table 1: Subject marks

	Chicks									
Identification signs	●	○	⊥	—	:	v	÷	+	I	=

Data processing

Excel 2013 software was used for data processing. The Chi-square Independence Test was used to assess the significant differences between feed consumption and the average weights of the broilers on the two farms studied.

The statistical parameters (the mean, adjustment equation, correlation coefficients), were calculated by farm. The formulas are as follows:

- average $\bar{X} = \frac{1}{n}\sum xi$

- adjustment equation $\hat{y} = \hat{a}x + \hat{b}$

- correlation coefficient $r = \frac{\mathbf{covar(x,y)}}{\sqrt{\boldsymbol{var(x)} * \boldsymbol{var(y)}}}$

RESULTS

Food consumption

A chicken consumed on average 1082.83g or 1.082 kg of feed on day 35 on the chickens of farm 1 and 1200 g or 1.2 kg during the same period on farm 2 with a significant difference (p <0, 05). Over the entire driving period, the average weekly consumption of farm 1 was lower than that recorded on farm 2 (Table 2).

Table 2: Evolution of the average weekly consumption of the subjects of farm 1 and farm 2.

Food consumption (g / subject)						
Age (Week)	Week 1	Week 2	Week 3	Week 4	Week 5	p-value
Farm 1	469	683	963	1089	1200	< 0,05
Farm 2	282	361	515	859	1083	

Average weights

At 35 days, the average weight obtained was 1596 g for chickens on farm 1 and 2400 g for those on farm 2 with a significant difference (p <0.05) as shown in Table 3. From day 1 to 4th week, the two curves had the same evolution but with different values and the average weight of the chickens of farm 1 remained below that of farm 2. From the 4th week to the 5th week, the weight of farm 2 increased rapidly while that of farm1 evolved slowly.

Table 3: Evolution of the average weight of the chickens on the two farms.

Average Weight (g)						
Age (Week)	Week 1	Week 2	Week 3	Week 4	Week 5	p-value
Farm 1	290	732,4	1169	1501	2400	< 0,05
Farm 2	174,5	386,62	625,95	1184	1520	

Average weight-length relationship of chicken

The representation of the average weight as a function of the length of the chicken gave correlation coefficients of 0.95 and 0.96. There was a positive correlation between these two parameters. The length of the chicken made it possible to deduct the weight (Figures 2 and 3).

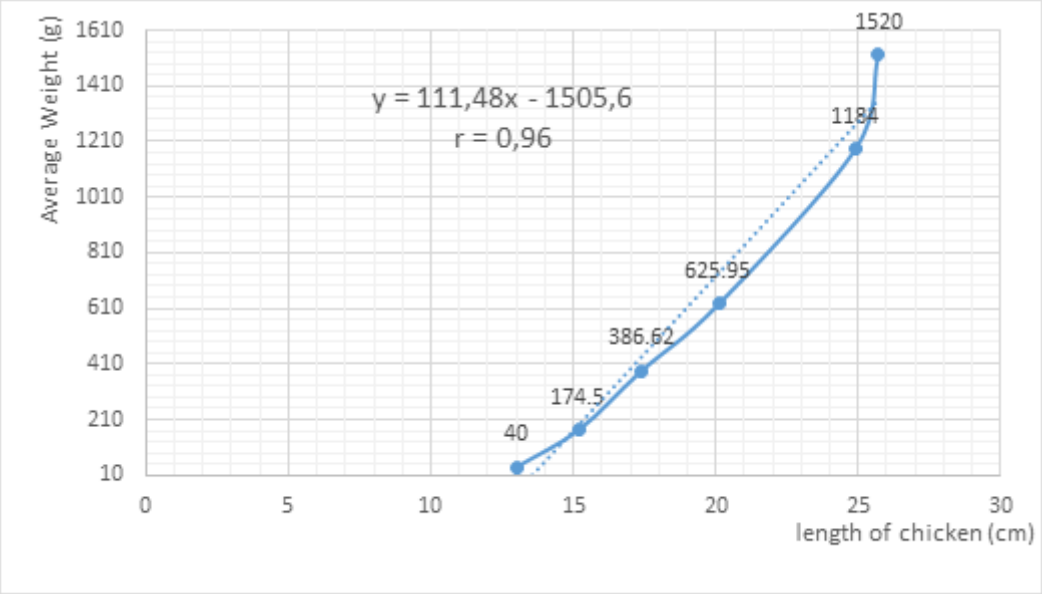

Figure 2: Relationship between average weight and length of chicken from farm 1

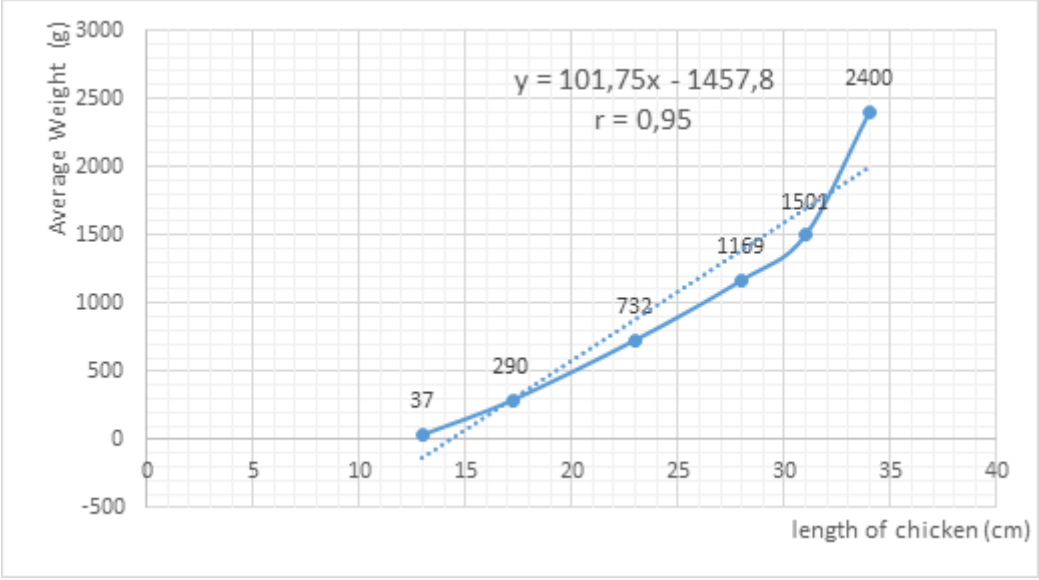

Figure 3: Relationship between average weight and length of chicken from farm 2

Average weight-spout length relationship

The two tables indicated that on the 1st day, with an average weight of 40 g for farm 1 and 37 g for farm 2, the chickens had the same spout length worth 1 cm. From the 1st

week to the 5th week, the spout length remained the same with a value of 2 cm. The correlation coefficients between these two parameters for these two farms (r=0.31 and r= 0.26) were low. For this purpose the equation did not give a normal value. There was no correlation between the weight and the spout length (Tables 4 and 5).

Table 4: Relationship between average weight and spout length of broilers on farm 1

Farm 1				
Age (Week)	Average Weight (g)	Spout length (cm)	Adjustment equation ($\hat{y}$)	r = Correlation coefficient
1st day	40	1		
Week 1	175,5	2		
Week 2	386,62	2	$738x - 698,35$	$r = 0,26$
Week 3	625,62	2		
Week 4	1184	2		
Week 5	1520	2		

Table 5: Average weight-spout length relationship of broilers on farm 2

Farm 2				
Age (Week)	Average Weight (g)	Spout length (cm)	Adjustement equation ($\hat{y}$)	r = Correlation coefficient
1st day	37	1		
Week 1	290	2		
Week 2	732,3	2	$1181,5x - 1144,5$	r= 0,31
Week 3	1169	2		
Week 4	1501	2		
Week 5	2400	2		

Relationship between average weight and thigh length

The representation of the average weight as a function of the length of the thigh gave correlation coefficients of value 0.94. This correlation was positive between these two

parameters. This correlation gave good value through the equation. There was a correlation between these two parameters (Figures 4 and 5).

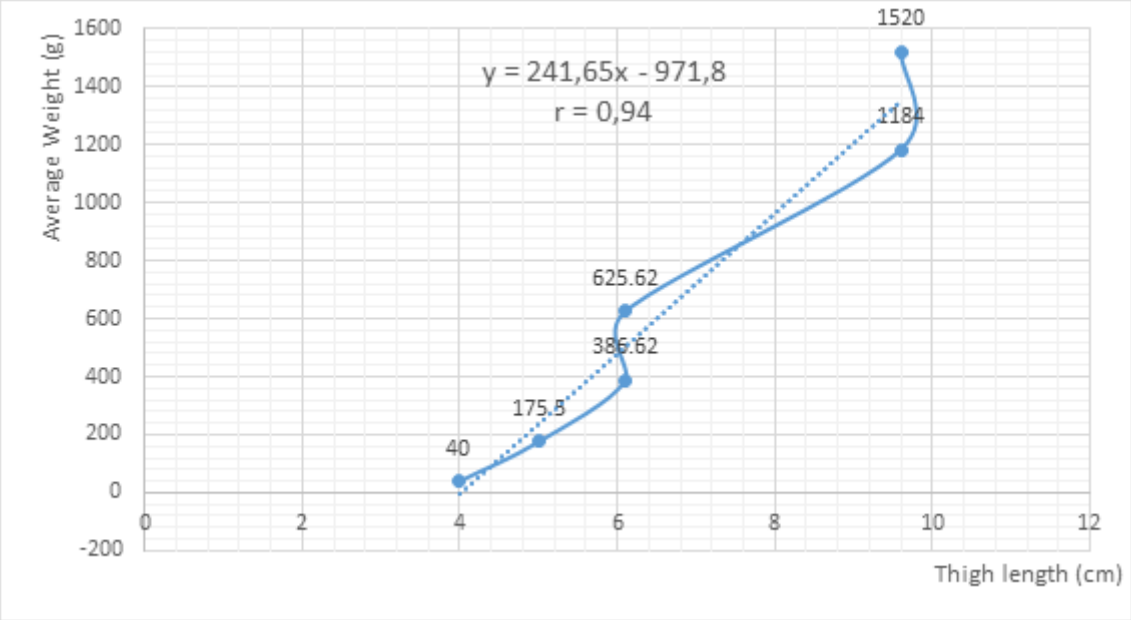

Figure 4: Average weight-length relationship of the thigh length of broilers chickens on farm 1

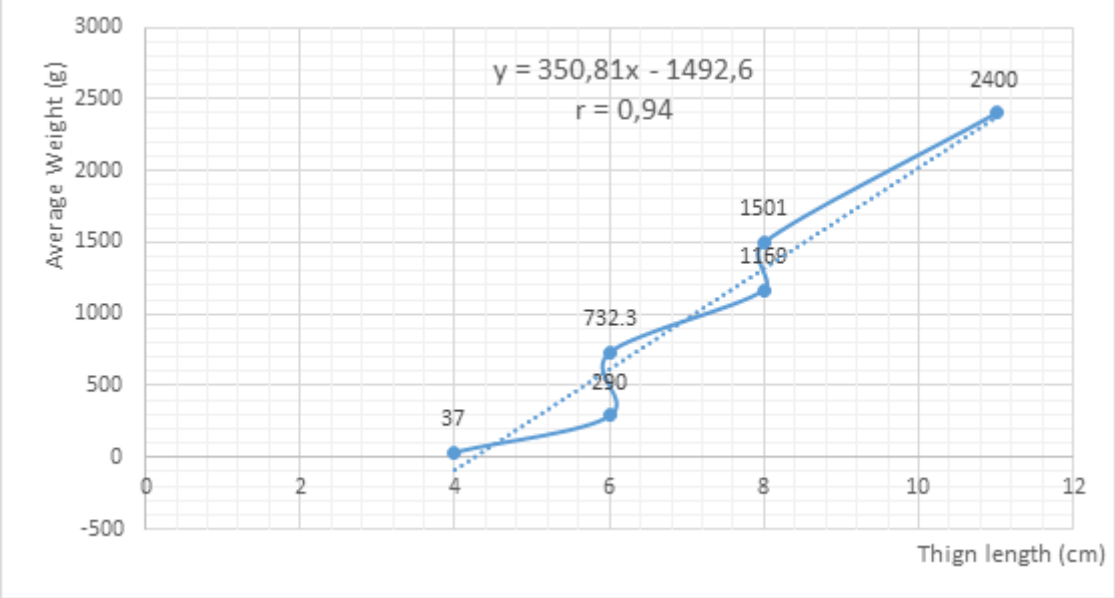

Figure 5: Average weight-length relationship of the thigh length of broilers on farm 2

Average weight-height relationship at withers

The representation of the average weight as a function of the height at the withers gave a constant correlation coefficient of 0.97. The correlation obtained between these two parameters was positive. Knowing the height at the withers allowed us to give the weight (Figures 6 and 7).

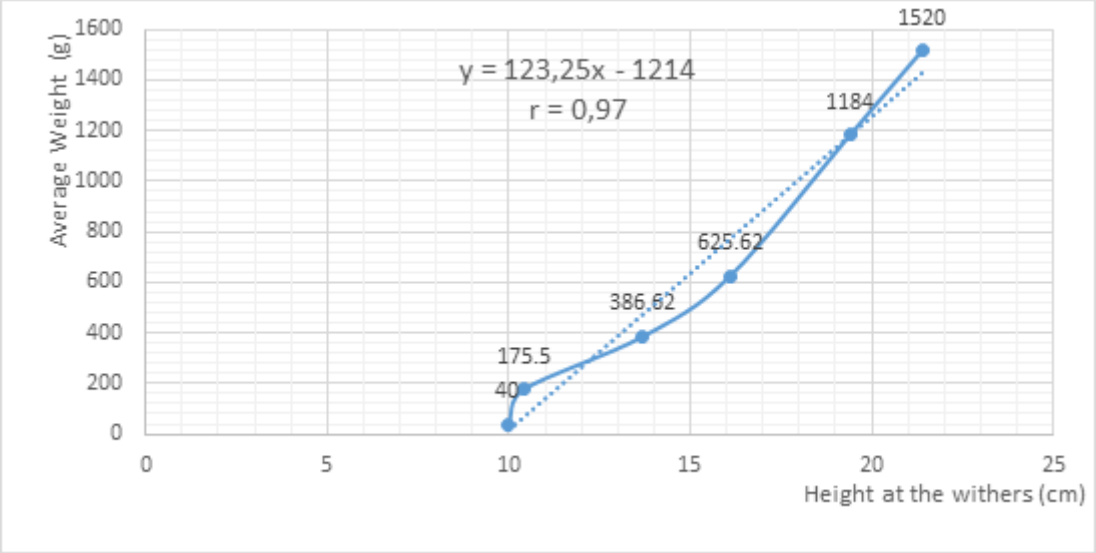

Figure 6: Relationship between average weight and height at the withers of broilers on farm 1

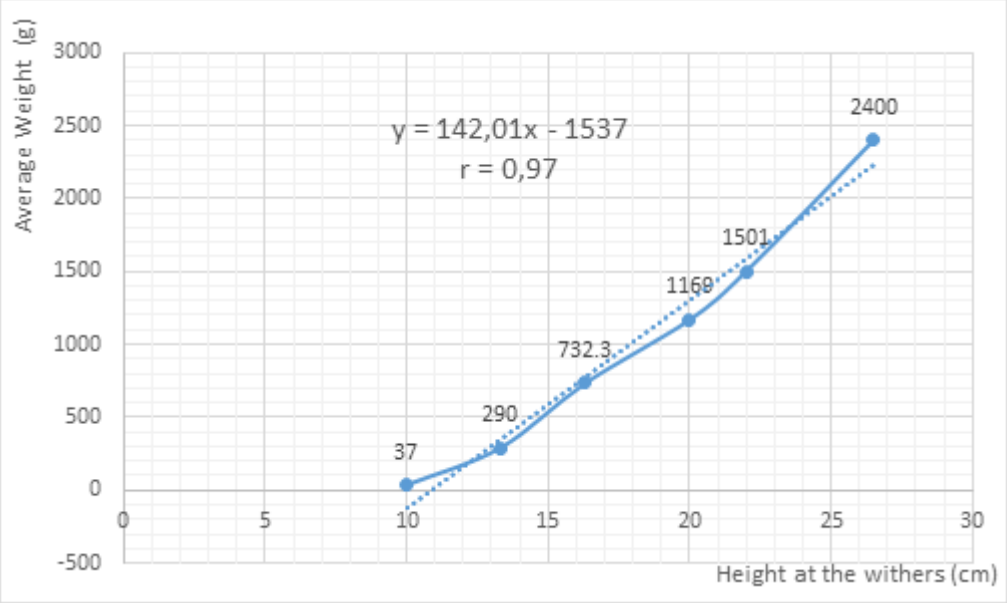

Figure 7: Relationship between average weight and height at the withers of broilers on farm 2

Average weight-chest measurement

The graphical representation of the average weight as a function of the length of the chest measurement gave correlations of value 0.95 and 0.97. This means that there was a positive correlation between these two parameters. These correlations gave good value with the equation. Knowledge of the length of the chest measurement made it possible to assess the weight (Figures 8 and 9).

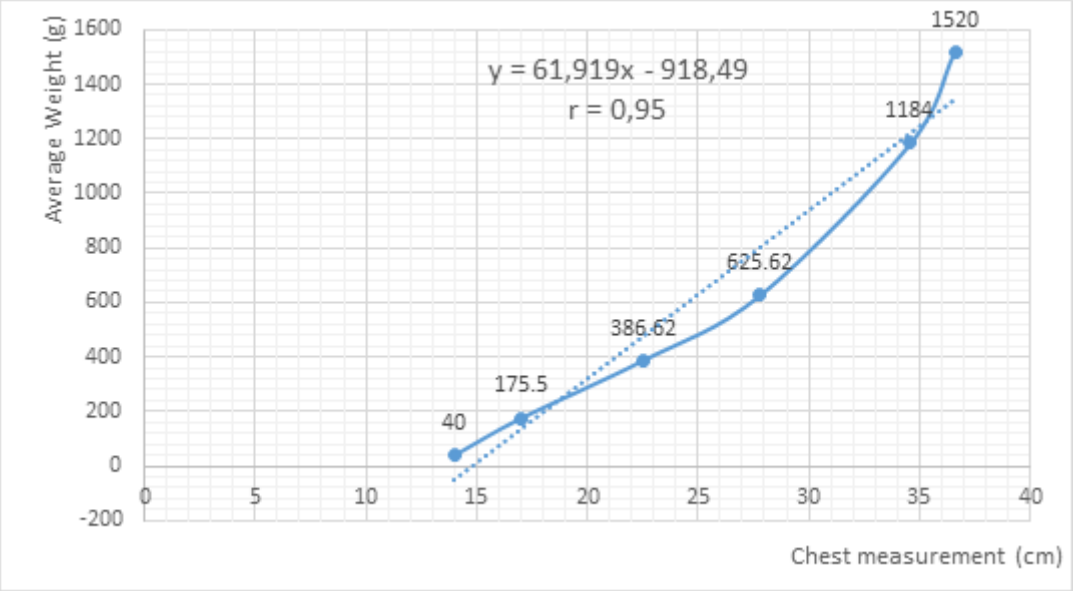

Figure 8: Relationship between average weight and chest measurement of broilers on farm 1

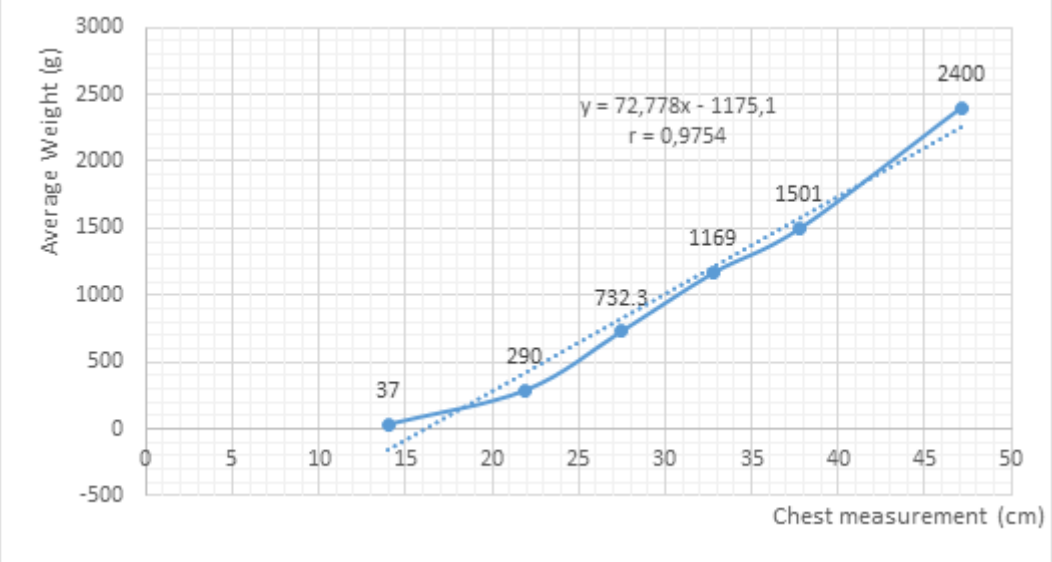

Figure 9: Relationship between average weight and chest measurement of broilers on farm 2

Average weight-foot length relationship

Average weight as a function of foot length gave R2 correlation coefficients of 0.92 and 0.93. These correlations obtained were positive. With these correlations, the equation gave low values. The length of the foot did not allow the weight to be determined (Figures 10 and 11).

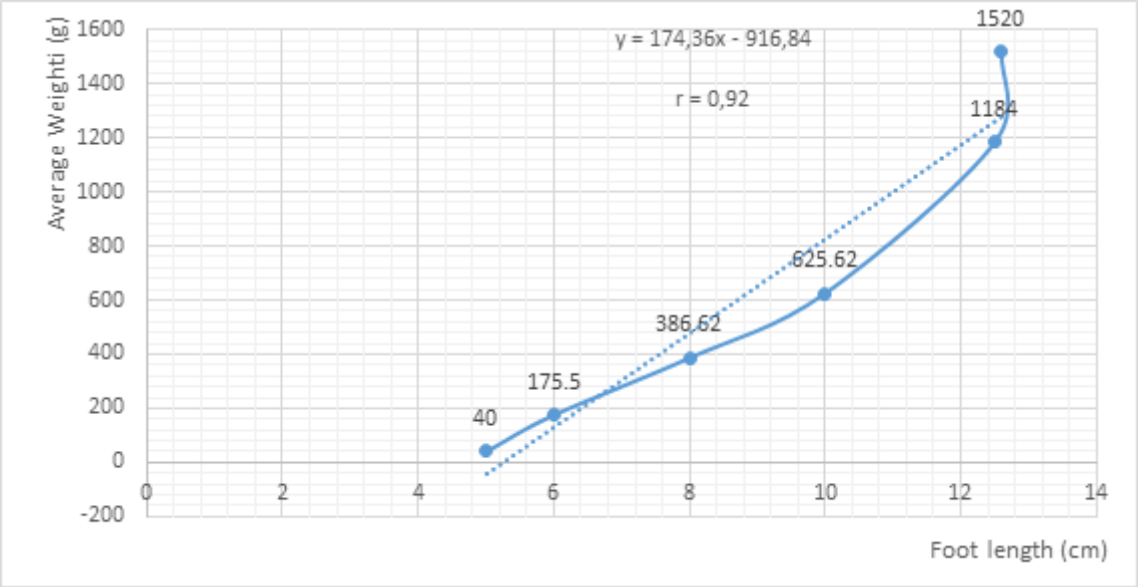

Figure 10: Average weight-length relationship of the foot length of broilers on farm 1

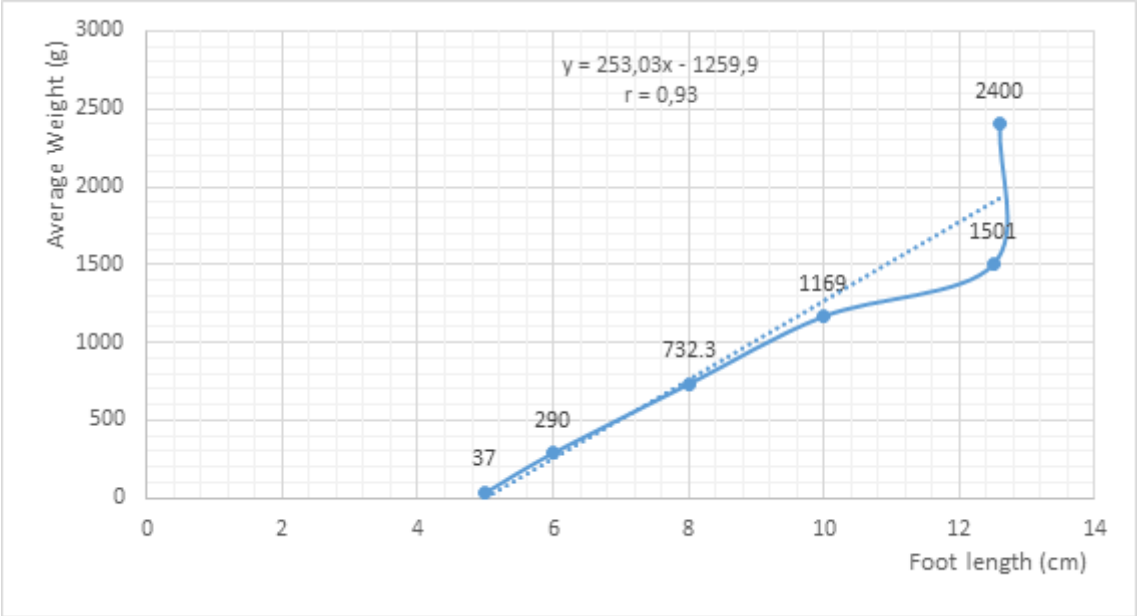

Figure 11: Average weight-length relationship of the foot length of broilers on farm 2

DISCUSSION

The amounts of food consumed by broilers on both farms are higher than consumption standards which range from 805 g / week to 910 g / week in 49 days [12]. This difference could be explained by the lack of training in breeding for most breeders and the low level of education of these as evidenced [8] which indicate that the level of education has a more or less effect important on production.

The average weight obtained for the broilers of the two farms (1520 g and 2400 g) is in accordance with the result of [17] which stipulates that a broiler must reach its age of slaughter between the 5th and the 8th week with an average weight ranging from 1.8 kg to 2 kg.

At the level of the mean weight-length relationship of the chicken, the values of the correlation coefficients obtained are 0.95 and 0.96. These correlations are greater than 0.9. Through these values, there is a link between the average weight and the length of the chicken. These results are in agreement with the work of [5] which stipulates that the live weight of broilers of industrial strain is moderately associated with the length of the body.

In the case of the relation between average weight and length of the thigh, the correlation coefficient is 0.94. The correlation obtained between these two parameters is positive and greater than 0.9 ($r > 0.9$). The length of the thigh therefore changes in the same direction as the average weight. The results obtained are superior to those [4] which obtained a positive but weak correlation of 0.7, thus indicating no link between the average weight and the length of the thigh.

For the relationship between average weight and beak length, the values remain constant at 2 cm over the entire period. The correlation coefficients obtained between these two parameters are positive (0.31 and 0.26) but low $r < 0.9$. The low correlation obtained for these two farms would mean that there is no relationship between the length of the beak and the weight regardless of the growth of the chicken. [3] Indicates that the length of the beak is not an accurate measurement. As a result, there is no correlation between the weight and the length of the beak.

Between the relationship between average weight and height at the withers of the chicken, the correlation coefficient obtained is constant with the value of 0.97. This value obtained is positive and greater than 0.9 (r> 0.9). The height at the withers is related to the weight. This result is in agreement with those of [2] who through these works obtained a correlation greater than or equal to 0.9 (r≥0.9). The values of the correlations are of the same order of magnitude as those of [7] which obtained a value of 0.97.

For the relationship between average weight and chest measurement, the values obtained give correlations of value 0.95 and 0.97, which is greater than 0.9. These correlations show that there is a relationship between the chest size and the weight. [9] confirms our results and states that the circumference of the chest is an exact character and is more related to the weight than to the size. A correlation coefficient (0.97) has also been reported by [15] who indicate that the chest measurement is used to predict weight.

The correlations obtained between the mean weight - foot length relationships are 0.92 and 0.93 positive and greater than 0.9 (r> 0.9). For this purpose one could say that there is a correlation between these two parameters. These results are identical to those of [16] who obtain correlations of 0.92 and 0.93 between these two variables. On the other hand [12] found correlations of r = 0.6 to 0.7 between the average weight and the length of the foot. This difference could be explained by the type of chicken selected for the study.

Among the measurements studied, some give values greater than 0.9. These are: the length of the chicken, the circumference of the chest, the height at the withers, the length of the thigh, and the length of the foot. Correlations obtained greater than 0.9 have been underlined by [19]. In their study, they indicate that a correlation coefficient must be greater than 0.9.

CONCLUSION

At the end of our study, it is clear that most of the measurements are correlated with the average weight in broilers. These are the length of the chicken, the circumference of the chest, the length of the foot, the length of the thigh and the height at the withers. However, the length of the beak is not correlated with weight gain. This study

highlighted another method for determining the weight of a broiler without using a scale. However, breeders should be trained on determining the average weight of broilers with body measurements in order to better sell their production at reasonable prices and avoid bankruptcy. Similar studies on other types of poultry should be considered.

CONFLICT OF INTEREST

No conflict of interest exists between the different authors.

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