

Comparison of chicken feed effects on development



All six significant domesticated agricultural animals today chicken, cow, goat, horse, pig and sheep had been domesticated in Eurasia by 5000 BP. (Thompson, 2002)

The earliest evidence of domestication of chickens relies on interpretation of archaeological discoveries of bones and artefacts. (Crawford, 2003)

Archaeological discoveries in China indicate that chickens had been domesticated by 5400 B. C. (Crawford, 2003) People of Cishan Culture (Neolithic Yellow River culture in northern China) had chickens then, but it is not known whether these birds made much contribution to modern domestic fowl. (Crawford, 2003)

The jungle fowl (*G. gallus*), has without a doubt been a major contributor to domestic fowl (Crawford, 2003). The chicken (*Gallus, gallus* or *Gallus domesticus*) is generally considered to have evolved from the jungle fowl (*G. gallus*). (Kennth & Kriemhild, 2000) The jungle fowl (*G. gallus*) ranges throughout the area between eastern India and Java. (Kennth & Kriemhild, 2000)

There are four key steps to domesticating poultry which were that in early stages of domestication poultry had to forage on their own. (Crawford, 2003) They had to be able to reproduce in captivity (Crawford 2003) the ability to imprint was important in initial taming. (Crawford 2003) and the species had to have a social order that allowed the keeping of large numbers of individuals. (Crawford, 2003)

The main role of chickens now is to produce eggs and meat for the market.

In 2004/2005 the gross value of production in Australia for the chicken meat and egg industries was estimated at approximately \$1.3 billion.

(Department of Primary Industries, 2008) Poultry meat is now the most consumed meat in Australia. (Department of Primary Industries, 2008)

Although chickens are strongly associated with egg production, they also have very different associations. (Kennth & Kriemhild, 2000) In much of Southeast and East Asia they have been bred both for fighting and as a decoration. (Kennth & Kriemhild, 2000)

There are four different types of poultry enterprises: broilers (production of chicken for meat), layers (birds producing table eggs), rearing farms (production of point of lay pullets) and breeder farms. (Department of Primary Industries, 2008)

The layout of the shed and type of housing differs between the types of poultry operation. (Department of Primary Industries, 2008)

The aims of this experiment are to monitor and assess the development of chickens on different feeds using a feed conversion ratio, and to observe and describe their physical and behavioural development over time.

On appointed days chickens were to be fed and given water on a daily basis. Excess foods were weighed and recorded so ratios could be calculated and obtained. Chickens were weighed on a weekly basis, on Wednesdays, so that the calculation of growth rate could be put monitored and observed. Along with this observations were made of chickens on various days, if not everyday for behavioural studying purposes.

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It was hypothesised that chickens fed on broiler feed would have a greater weight gain than chickens fed on layer feed over the 5 week period.

METHODS

The chickens were obtained from a poultry farm known officially as Wagner's Poultry Enterprises. The chickens given were White Leghorn cross New Hampshire at the age of one or two days old. The chickens were divided into groups of six and student groups of approximately sixteen students were assigned to one group of chickens each.

Chickens were placed in pens and in turn students were assigned to the pens where the chickens were kept through out the five week duration. The chickens pens located at La Trobe University's Agricultural Reserved housed a total of twelve chicken pens. The type of feed given to the chickens was decided by the group number the pen was given. Groups assigned to even number pens were to feed their chicken's broiler feed, brand named 'Brastoc Turkey and Meat Chicken Starter', and odd numbered pens were to feed their chicken's layer feed, 'Barastoc Pullet Starter'.

The pens were isolated, self-contained and about 1 x 1 x 2 m in size. The floor of the pens was concrete which was covered in black lining and contained a sawdust base. The top of the pen had a plastic mesh over it to prevent escape. The chickens were provided with heat lamps, feeders and water dispensers all attached to a chain and hooked to a pole above the mesh. The feeders and water dispensers along with the heat lamps were adjusted in accordance with the chicken's age.

Observations were carried out as much as possible, sometimes even twice in the one day, but generally all days except Tuesday was observed in accordance with the student's university timetable and their availability. The duration of the observations under went intervals of fifteen minutes, where all aspects of behaviour and development were documented. Observations were done under the least amount of outside influence as possible, in respect to this only two students were allowed in the shed where the chicken pens were being kept and students were encouraged to keep noise to a minimum.

As the weeks went on chickens behaviour that was recorded included those such as grooming, resting, drinking, interacting, alarming, ambulatory and aggressive. Above all the behavioural and developing attributes the hierarchy if any of chicken formation was also documented. All observations were recorded and documented into a plain exercise book by each student of the group, with clear indication of whom the observations were done by.

Chickens were feed every second day, Monday, Wednesday and Friday, with enough food given on each day to last the chickens for days not fed and on Fridays for the weekend. Initially a total of 240g were placed in the feed dispensers to accommodate the 20g required for each individual chicken and to compensate for the day the chickens would not be fed. The amount given to the chickens on feeding days was adjusted to accommodate for their growth further along in the project.

Along with accommodating for the size of chickens the amount of feed to be given to chickens in further weeks was also based upon amount of feed

offered and refused, all of which was weighed and kept a record of. Food was weighed on an electric scale in a container provided. The amount of food given and refused was always recorded on a sheet given to us indicating the date and feed given and refused. The sheet was stored along with our observation book, hooked onto a nail on the outside of the allocated chicken pen.

Chickens were checked on a daily basis and were given fresh water daily if needed, except for weekends, providing the chickens with fresh drinking water. Replenishment of water was recorded alongside on the same sheet of paper where the feed record was being kept.

Table 1. A timetable showing jobs carried out each day over the 5 week period

Monday

- Feed, water check and observations

Tuesday

- Water and chicken check

Wednesday

- Feeding, weighing, water check and observations

Thursday

- Observation, chicken and water check

Friday

- Food, water and observation

RESULTS

Table 2. Composition of feeds

Composition: Crude Protein (minimum) (%)

Layer feed: 19.5

Broiler feed: 22

Composition: Crude Fat (minimum) (%)

Layer feed: 2.5

Broiler feed: 2.5

Composition: Crude Fibre (minimum) (%)

Layer feed: 6

Broiler feed: 5

Composition: Salt (maximum added) (%)

Layer feed: 0.3

Broiler feed: 0.3

Composition: Copper (added) (mg/kg)

Layer feed: 0.8

Broiler feed: 8

Composition: Selenium (added) (mg/kg)

Layer feed: 0. 1

Broiler feed: 0. 3

Composition: Calcium (minimum) (%)

Layer feed: 1

Broiler feed: 1

Table 2. Shows that layer and broiler feed had the same amount of crude fat, salt and calcium. Broiler feed has more crude protein, copper and selenium than layer feed, whereas Layer feed has more crude fibre than broiler feed.

DISCUSSION

The results support the hypothesis that chickens fed on broiler feed would have a greater weight gain than chickens fed on layer feed over the 5 week period, as table 3 and figure. 1 show that chickens fed broiler feed had a higher average weight gain then chickens fed on layer feed.

The aims of this experiment to monitor and assess the development of chickens were carried out over the five weeks and observations were made describing their physical and behavioural development over time. The experiment was carried out on chickens with different feeds and a feed conversion ratio was calculated. We also provided the chickens with clean drinking water, sufficient food amounts of food according to their age and feed refusal and a suitable environment in which they could grow and develop certain behaviours.

The broiler chickens had a higher growth rate, as shown by table 3 and fig. 1. By the end of the 5 weeks, the broiler chickens reached a live-weight of 467 ± 58 where as chickens who consumed the layer feed for the duration of the experiment reached a live-weight of 429 ± 61 .

The difference between the growth rates of the broiler and layer chickens is closely related to live-weight. Through out the process, beginning in week one, chickens being fed broiler as opposed to layer maintained a higher growth ratio and remained heavier than the chickens being fed the layer product. In respect to this broiler chickens are capable of higher growth rates and greater weight gain than layer chickens. In the poultry industry, broiler chickens are selected for their carcass processing characteristics and meat density, whereas layer chickens are genetically bred to achieve smaller body weights than those of the broilers (Department of Primary Industries, 2009).

Another factor of the growth and weight gain in chickens could also be the composition of the feeds. As seen in table 2 the broiler feed contained 2.5% more crude protein, 7.2 mg/kg more copper and 0.2 mg/kg more selenium than the layer feed. All these factors could've influenced the growth in chickens and could be why chickens fed broiler feed would gain more live-weight as well as maintain a higher growth ratio.

The increase in growth rate found within broiler chickens has been found to be linked to an increase in the deposit of fats and the use of energy. (Geraert et al 2006) All ingredients found within the chickens feed contributes some part to their growth and weight gain. Copper's influence on health and growth within a chicken is present as the antimicrobial properties found within

Cooper help to improve an animal's performance such as; increase growth in poultry, improved growth rate, feed intake and feed efficiency (Forbes & Shariamatdari 1993). Crude protein also influences the diet energy of a chicken when they are still young (Hayashi et al 2000) as well as their metabolic ability. (Hayashi et al 2000)

From the experiment as show in table 4, it shown that broiler chickens have a slightly better feed conversion ratio of 1.5 ± 0.129 g but also maintain a higher feed intake 3889 ± 534 g than that of layer chickens, whose feed conversion ratio is similar to that of the broiler chickens at 1.52 ± 0.051 g and less of a feed intake at 3549 ± 247 g.

Calcium levels also differ between that of the layer and broiler feeds. Layer feed has 0.5% more calcium than broiler feed. Calcium ratio plays a vital role in the quality of an egg produced, (Department of Primary Industries)

As the chickens grew and developed more, so too did their behavioural characteristics. To begin with the chicks were hardly active at all being under the heated lamp majority of the time, however after a fortnight the chickens activity level was significantly higher, showing signs of flapping wings and a lot more running around within the pen. This behaviour of flapping of the wings is a mechanism known as break used by chickens. (Rogers 2006)

Within the second week it was observed that chickens were preening one another, this type of behaviour was commenced whilst the chickens were flocked together in a group always near a wall. Preening aids in the removal of lice and is done using the beak (Gush 2006).

As the chickens progressed with age in the 4th week a lot of the time was spent sitting perched up above the food and water dispensers. This type of behaviour is normal and is to be expected after four weeks of age. (Rogers 2006)

Through out the five week period and supported by table 6 interactions was the most common behaviour during the experiment. Among these interactions were behaviours such as pecking and scratching, which were major contributors to the interaction database. The behavioural interaction of pecking and scratching are present during all ages of a chicken (Rogers 2006) and are the major ways in which chickens interact and assimilate with their surroundings. (Gush 2006)

Through out the 5 week period no formal hierarchical establishment appeared to be present. However there was the mild sign of aggression where chickens would kick at each other within the third week but this type of behaviour was rare and unseen after later dates. A hierarchy within chickens is not formed up until about the sixth week or onwards within domestic chickens (Rogers 2006) and thus no aggressive behaviour was present either as aggression is derived from the sequence of the hierarchy. (Rogers 2006)

It was found that roosters were among the chickens which were handed out to us. Roosters in general like male and female humans tend to be heavier than that of their female counter. The inclusion of roosters within the results could be erroneous to the over all weight gain results. This experiment could be improved by regulating the gender of the two strains of chickens being

introduced to the artificial environment thus giving more accurate and reliable end results and will nullify the problem of genetic variability.