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BROILER PRODUCTION EXPLATION– STEPS TO START

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ABSTRACT

There is nothing quite so helpless in this world as a baby broiler chick which has been snatched from the warmth of its surrogated mother, carted umpteen kilometers in a box dumped unceremoniously in a broiler shed and then told to get on with the job of making the boss a wealthy man. Yet within the space of 14 days, that same chick, under optimum conditions, will have increased its day-old body mass eightfold by putting on weight at an average rate of one gram per hour, costing its owner no more than a meager 1,3 grams of feed per hour! Or, putting it another way, at today's market prices, that little chap is growing at the rate of one cent every three hours on a feed cost of no more than 0,2 of a cent.

KEY WORDS: Broiler, production, management, condition

Overview

The ability of a broiler chick to reach its potential body mass at around the seven week old mark is determined to a larger extent by what treatment it receives in the first two weeks of life, as this is the foundation period on to which the remaining five weeks will be built. Any mistakes during this period could prove costly later on (Garrigus, 2007). The purpose of these notes is therefore to identify and discuss the various inputs which are required to produce a strong healthy broiler, and where better to start, than with the animal itself.

1. THE DAY-OLD CHICK

It would be quite easy to dismiss this section by saying "only buy quality chicks from a reputable supplier", but the word "quality" goes beyond the simple observation that the chicks look bright and chirpy. The breeder and hatchery do contribute a great deal to the finished product and a pre-requisite for successful broiler growing is that the stock which is purchased must be carrying the genetic potential to achieve what the prime breeder maintains to be an attainable goal. The following table gives an ideal of what sort of weights can be achieved from a modern broiler breeder.

TABLE 1

Broiler liveweight performance

Age (Days)	Males (Kg)	Females (Kg)	As Hatched (Kg)
7	0.125	0.125	0.125
14	0.345	0.335	0.340
21	0.685	0.635	0.660
28	1.055	0.935	0.995
35	1.510	1.290	1.400
42	1.980	1.650	1.815
49	2.455	1.995	2.225
56	2.935	2.325	2.630

(Extracted from Ross Broiler Management Guide)

Hatching egg into a viable chick rests with the hatchery. Even before the egg reaches the incubators hatchery practices can have an influence on what eventually comes out of the broiler shed. For example there is a correlation between the length of time which a hatching egg is stored prior to setting, and the final body mass of the broiler (Weeks et al., 1999).

TABLE 2

Egg holding period and broiler weight

Holding period	Mature broiler Weight
1-7 days	1.86kg
8-14 days	1.84 kg
15-21 days	1.79 kg

There is also a correlation between the size of a hatching egg and the weight of the day-old chicks (Smith, 2010). It obviously follows that a small egg will produce a small chick and that a larger egg will produce a larger chick; however the percentage difference in weight fortunately does not follow through to the finished broiler. For example a 20% difference in chick weight, 43 grams as against 34 ,5 grams, will not mean a 20% lighter broiler at term. The difference is more likely to be around 4%. Table 3 gives example of the influence of egg-weight on finished broiler weights.

TABLE 3

Correlation between egg, chick and broiler weights

Egg weight	Chick weight	Broiler weight
66.0g	43g	1.900kg
61.5g	40g	1.875kg
56.7g	37g	1.850kg
52.0g	34g	1.823kg

Dehydration in often a common problem with day-old chicks, and a 5% to 8% loss in body mass can often be recorded if the chicks have either been held too long in the incubators or too long in the chick holding room. Long journeys will also contribute to dehydration as can often be witnessed by freshly placed chicks jumping into the drinking water!

From the chick supplier's point of view it is often difficult to produce large quantities of uniform chicks – the size of his breeding flocks being the limiting factor. A good hatchery will try to match up parent ages when setting eggs so that the resulting chick weights are fairly close together. Chicks from both ends of the breeding cycle can be as much as 15 gram apart in body mass and it is not difficult to imagine the antagonism that would be going on under the brooder if the weight spread was too great (Moyle et al., 2010).

Another factor which may affect chick uniformity is the time of year. Many breeders rear their breeding stock in open housing and therefore have to contend with increasing or decreasing day lengths. Chickens reared on a decreasing natural day length will come into lay quickly and rise sharply up the production graph, the result being a supply of good even-sized eggs. On the other hand, chickens reared on an increasing natural day length day will come into play more slowly and their rate of ascent up the production graph will be more lethargic. This situation gives rise to a variable egg-size and may last until the parent flock is 35 weeks of age.

A well-hatched chick should be uniform in color. Bear in mind that the natural color of day-old broiler chicks is creamy colored and it is only the use of formaldehyde vapor in the hatching cabinets that turns them yellow. A preponderance of cream chicks among normal yellow ones would indicate a protracted hatch with the tale-enders not being subjected to formaldehyde. Invariably these cream chicks end up as mortality and should be removed during the grading process in the hatchery. There is a move afoot internationally to have the use of formaldehyde banned due to its carcinogenic properties, so it is possible that all chicks in future will turn out off-white.

A quality day-old chick can therefore be summed up as follows:
• It must possess the genetic potential to achieve prescribed targets.
• It should not weigh less that 34 gram.
• It should not arrive dehydrated as a result of being held too long in the hatchers, holding rooms or vehicles.
• It should arrive on the farm "raring" to go, and not "pooped" as a result of overheating in transit.
• The batch to which it belongs should be uniform

• It should possess good parental immunity to most common poultry diseases.
• If vaccinations are required they should have been done by trained hatchery staff
• It should be free from infection, i.e. there should be no omphalitis, aspergillosis of pasted vents
• It should have a normal appearance by being bright-eyed and vigorous and free from crossed beaks, curved toes, bowed legs, sunken eyes etc.
• Its fluff should be clean and dry and be a normal pale yellow.

2. FEED

As an input, feed represents almost 85% of broiler production costs, and, like the day-old chick, is subject to certain parameters to ensure that the customer receives a quality product. Before feed is ordered, the decision has to be made whether to use a crumble / pellet programed or a mash programed. In winter, particularly on the Highveld this question is of importance as the problem with ascites often precludes the use of a pellet programed. Under normal circumstances all the evidence would suggest that a pellet programed produces the best results.

TABLE 4

Feed Form and its Effect on Broiler Growth and Feed Conversion

Treatment	56 Day Weight (kg)	56 Day F.C.R
Pellets and Fines	1.92	2.15
All Pellets	1.90	2.16
Fine Crumbles	1.90	2.20
½ Pellets ½ Crumbs	1.91	2.16
All Mash	1.84	2.19

As far as the formulations go for the different components of a broiler diet i.e. starter, finisher, post-finisher, it is reasonable to assume that most of the major mills produce rations which are designed to accommodate the nutritional demands of the modern broiler, however, as a guide the following energy and protein levels may be of interest.

TABLE 5

Rations	Starter	Finisher	Post-Finisher
Cals Met. Energy/kg	3080 to 3190	3080 to 3190	3080 to 3190
% Crude protein	22-23	20-21	18-19
Form.	Crumble	Pellet	Pellet

Apart from nutritional considerations, other factors which contribute towards a quality feed are (Duncan et al., 1993):
• Freshness – old feed could well suffer from vitamin decomposition
• Low mould content – grain with high moisture content could generate toxin producing moulds.
• Free from extraneous matter – feed mills contain a lot of metal and occasionally bits do finish up in the bag

• Good pellets – the pellet has to stand up to the handling process and not finish up as mash in the feeder.
• Coccidiocide – ensure that you are receiving a reputable anti-coccidian product.
• Growth stimulant – be sure that the growth stimulant you are paying for is effective.

3. WATER

Water is vitally important to a chicken as it serves many functions, some of which are:
• Helps to cool the bird by evaporation through the lungs and air-sacs.
• Aids in the digestive process.
• Aids in the removal of waste from the body.
• Aids in the production of blood and lymph.
• It makes up 60 to 70% of the body.

Excessive mineral content of water can cause problems, such as too much sodium causing wet litter problems, or excess iron interfering with the metabolism of phosphorus and thus leading to leg problems. Where water from sources other than municipality supplies is being used, the occasional check by an analytical chemist is advisable. Do not take water quality for granted. Table 6 shows the threshold levels in a safe water supply for chickens.

TABLE 6

Factor	Threshold concentration mgm/litre
Total dissolved solids	2500
Total alkalinity	500
Calcium	500
Magnesium	250
Sodium	1000
Bicarbonate	500
Chlorine	1500
Fluoride	1
Nitrate	200
Nitrite	0
Sulphate	500
Copper	1
Cadmium	5
Iron	0

As well as meeting certain mineral specifications, water must also be relatively free from pathogenic bacteria and if contamination should exceed 1000 coliforms per 100ml then it would be advisable to sanitize the water with chlorine to give 3 to 5 ppm at drinking level.

4. HOUSING AND EQUIPMENT

It is difficult to class housing and equipment as an input, however, without them there in no broiler production. Good poultry housing tends to alleviate the extremes in the bird's environment and to make it easier for the chicken to compensate for tits surroundings. This means a more optimum ambient temperature in the house, along with an adequate removal of moisture. Details of house designs and construction materials are a subject on their own, so suffice it to say that good housing should:

- Provide warmth to the birds in cold weather
- Reduce the ammonia level in the house
- Provide adequate air movement without providing drafts
- Cool the birds in hot weather
- Reduce the humidity in the house

When it comes to choosing equipment for a broiler house, the degree of sophistication which can be achieved is dependent on capital resources. Generally speaking, the less sophisticated the operation the more is required of the manager, however, equally good results can be achieved from an open convention house with tube feeders, as can from a fully automated controlled environment type house. In both cases, when it comes to producing a sturdy two week-old broiler, there is one thing in common, and that is a good brooding system (Gentle, 2011). A good brooding system should be able to simulate mother hen and provide warmth when it is required but at the same time allow the chick the opportunity to venture into cooler areas. When setting up a brooding system remember that different chicks have different temperature requirements. Growing make chicks have a slightly higher metabolic rate than do the females, and so will occupy cooler comfort zones of the brooding area. Small chicks tend to favor more heat than less heat. At the end of the day, brooding is more of a management skill than a mechanical skill and the making or breaking of a crop often occurs under the brooder. Like housing, choice of equipment including brooders often boils down to personal preference and the pros and cons of various types of brooders could form the basis of a lengthy discussion, which is not the purpose of these notes (Erikssonet al., 2008).

5. MANAGEMENT

Having discussed in some detail the variable inputs (chicks, feed and water) and having touched on the fixed inputs (housing and equipment) it is now time to throw in the catalyst that makes it all work, i.e. management. The definition of management in the context of chicken rearing is "the utilization of available resources in order to achieve the maximum performance from the investment", and whether one is managing a "string and chewing gum" operation or a "Rolls-Royce" operation the definition still applies. The following recommendations are intended as a management guide in order to produce a well-brooded two week-old broiler.

5.1 Litter

The type of litter used will depend largely on availability and suitability. If available, pine shavings make the best litter, but other alternatives include rice hulls, straw, corn cobs, shredded newsprint and peanut hulls. Try to avoid using hardwood shavings due to their high tannin content and because they splinter easily. Litter should be laid in the clean house at a depth of 8cm

and in the brooding area at a depth of 10cm. Litter should be managed in such a way that a moisture level of 20 to 25% is maintained. Below this level will give rise to dusty conditions, and above this level will result in litter becoming wet ant caked.

5.2 Brooding

Heat is generated by gas, oil, electricity, coal, wood or other fuels, and is supplied to the broilers in the following forms.

- Localized – where the birds have a central heat source and access to a cooler unheated area
- Whole house – where the complete house is heated to the same temperature.
- Combination – where the birds have central heat source and the remaining areas are warmed by the use of space heaters.
- Part house brooding – where brooding is performed by enclosing a section of the house with plastic curtains and brooding all the chicks in the reduced area for the first 10 to 21 days.

Most growers with open housing favor the latter alternative with suspended radiant or infrared brooders placed in the center of the brooding area Careful attention has to be paid to ventilation with this system, but if the ambient temperature can be maintained at around 23 to 25°C superior results will be obtained. Do not overstock brooders. If the manufacturers' recommendation is for 1000 chicks, then stick to it. The brooders should be set 24 hours before the chicks arrive and a temperature of 33 to 34°C should be recorded at the edge of the brooder 5cm above the litter. Place a 50cm high solid surround around each brooder approximately 1.25m from the edge of the brooder. During summer months this surround can be made of wire netting. Remember to expand the surround a little each day until it is on a gradual basis. It takes around 20 days for a chick to develop its own internal temperature control system, by which time the brooding area should be close to ambient temperatures. Generally speaking a reduction of 0.3°C per day is accepted practice.

Fresh water must always be available and it I recommended that at least 10 founts per 1000 chicks is located close to the heat-source, the most acceptable temperature of water for a chicken is about 19°C. Starting on the third day automatic drinkers can be introduced so that by the eighth day all chick founts have been replaced by automatics.

Feed should be supplied in the form of broiler starter crumbles for the first 21 to 24 days, or, an allocation of 1 kg of starter per bird is often considered sufficient before changing over to finisher pellets. Initially, feed should be provided in cut down chick boxes, feeder bases or proper plastic chick trays. Up to 25% of the brooding area can be allocated to feeding area. Try to alternate feed trays with water founts. By the 10th day the regular feeding system should be in full use, all trays having been removed.

Lighting is very important and often overlooked. There is no point in supplying lots of lovely grub and water if it cannot be seen half the time. Therefore, suspend 60w lights in the brooding area, sufficient for the chicks to be able to find their way around.

MEDICATION

As a rule it should not be necessary to administer soluble antibiotic to baby chicks, however, the use of vitamins and electrolytes for the first three days may be of value, especially if chicks have been stressed by dehydration, chilling etc. The use of an anti-mycoplasma product is strongly recommended, particularly in winter when the effect of MG can be quite devastating.

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