

MAKING OWN POULTRY FEEDS



Formulae, Rations & Ingredients

**POULTRY FEEDING;
RATIONS ,
INGREDIENTS AND
REQUIREMENTS**

Feeds and Feeding

Poultry feed is food for farm poultry, including chickens, ducks, geese and other domestic birds.

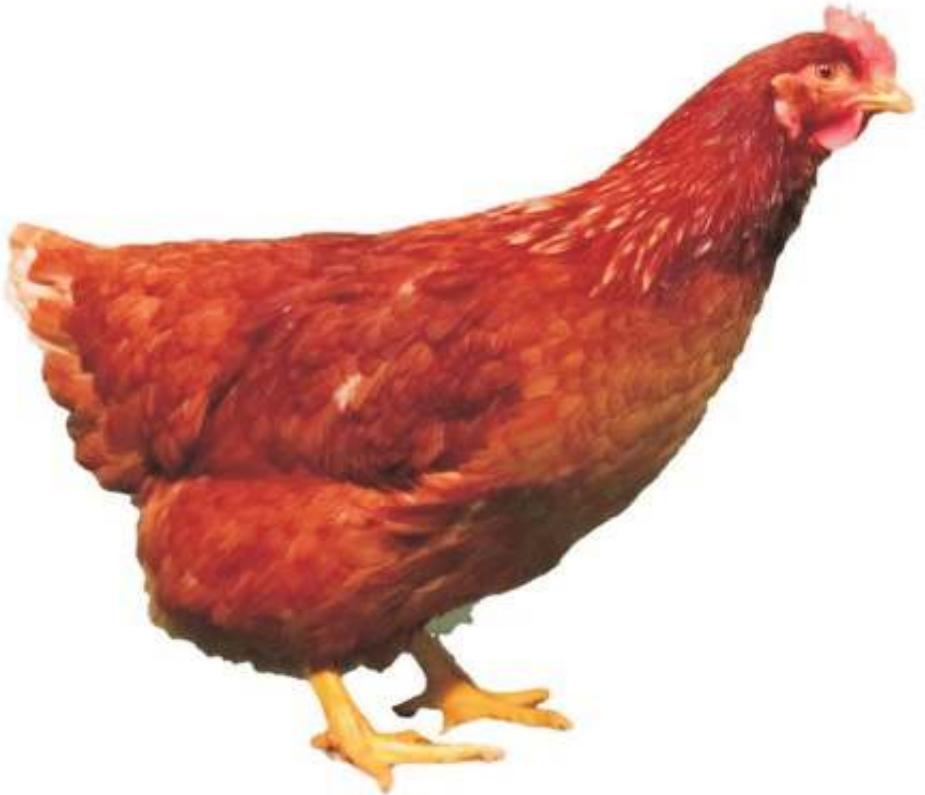
Before the twentieth century, poultry were mostly kept on general farms, and foraged for much of their feed, eating insects, grain spilled by cattle and horses, and plants around the farm. This was often supplemented by grain, household scraps, calcium supplements such as oystershell, and garden waste.

As farming became more specialized, many farms kept flocks too large to be fed in this way, and nutritionally complete poultry feed was developed. Modern feeds for poultry consists largely of grain, protein supplements such as soybean oil meal, mineral supplements, and vitamin supplements. The quantity of feed, and the nutritional requirements of the feed, depend on the weight and age of the poultry, their rate of growth, their rate of egg production, the weather (cold or wet weather causes higher energy expenditure), and the amount of nutrition the poultry obtain from foraging. This results in a wide variety of feed formulations. The substitution of less expensive local ingredients introduces additional variations

Healthy poultry require a sufficient amount of protein and carbohydrates, along with the necessary vitamins, dietary minerals, and an adequate supply of water. Lacto-fermentation of feed can aid in supplying vitamins and minerals to poultry. Certain diets also require the use of grit, tiny rocks such as pieces of granite, in the feed. Grit aids in digestion by grinding food as it passes through the gizzard. Grit is not needed if commercial feed is used.

The feed must remain clean and dry; contaminated feed can infect poultry. Damp feed encourages fungal growth. Mycotoxin poisoning, as an example, is "one of the most common and certainly most under-reported causes of toxicoses in poultry". Diseases can be avoided

with proper maintenance of the feed and feeder. A feeder is the device that supplies the feed to the poultry.[7] For privately raised chickens, or chickens as pets, feed can be delivered through jar, trough or tube



feeders. The use of poultry feed can also be supplemented with food found through foraging.[8] In industrial agriculture, machinery is used to automate the feeding process, reducing the cost and increasing the scale of farming. For commercial poultry farming, feed serves as the largest cost of the operation

Layers Feeds

* Chick and Duck mash should be used for chicks of 0 to 8 weeks of

- * Growers' mash should be used for pullets up to 18 weeks of age.
- * Layers' mash should be used for birds of 18 weeks to 76 weeks of age.

Feeding Layers.

- * Use recommended feed trough e.g. Naivasha feeders.
- * Fill the trough 1/3 to 1/2 full for dry feed.
- * Feed once or twice a day.
- * Always buy feeds from reputable feed stockists or manufacturers.

Layers' Feed Requirements.

For chicks 0 to 8 weeks of age, give 40gm per chick, per day, of chick/duck mash. This amounts to about 2kg chick/duck mash per chick for 8 weeks.

For pullets or growers 8 to 20 weeks of age, give 80gm per bird per day, of growers mash. This amounts to 8 to 9kg of feed per bird for 12 weeks.

For birds 20 to 76 weeks of age allow 120 to 130gm per bird, per day of layers mash. This amounts to about 45 kg of layers mash per bird from 20 to 76 weeks of age.

Note: For practical purposes, it is good to allow free lib for chicks and free feeding for the older birds if the feed troughs are appropriate and feeders are filled to appropriate levels. Birds will consume just enough and may not over eat, so long as feed is continuously available in the troughs.

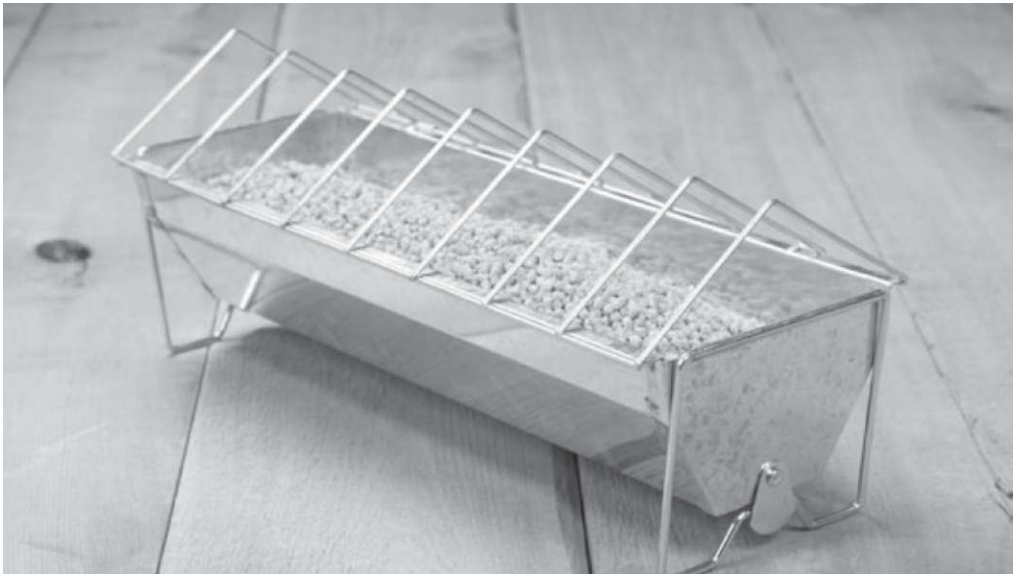
Wastage Control.

In a poultry enterprise, cost of feed constitutes 80% to 90% of total costs. It is important that feed wastage should be avoided wherever possible.

Wastage in a poultry unit will arise from poorly designed feed

feeders are fully filled to two-thirds-full, 10% of the feed is wasted; when feeders are half-filled, only 3% of the feed is wasted. Wastage also arises from theft by rats and wild birds if they have access to the poultry unit. Naivasha feeder is identified as a good anti-waste feeder.

It is necessary for every poultry farmer to buy proper feeders, fill them as recommended and keep off rats and wild birds.



Feeding Trough

Feeding Broilers

a. Feed Types.

Use broilers start mash up to 4 weeks of age. Use broilers follow up mash from 4 to 7 weeks of age.

b. Frequency.

Feed the birds ad lib.

c. Quantity.

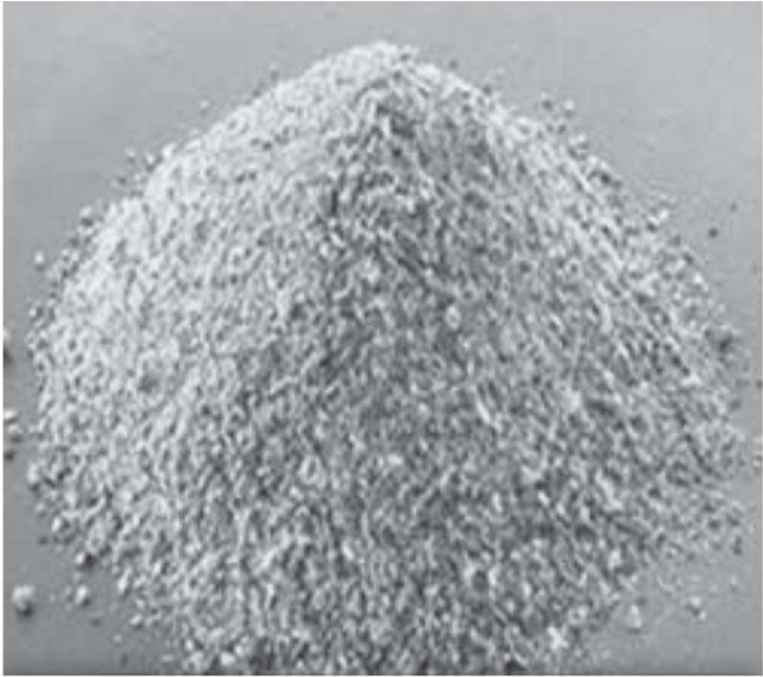
Normally birds will consume 4 to 5kg per bird to reach slaughter weight in 7 weeks.

Slaughter weight is normally 2kg Life Weight.

Farmers should check feed loss into the litter by using proper feeders and filling feeders properly.

Note: Farmers should not keep broilers if they do not have a ready market. After broilers reach their market weight they should be sold out otherwise the farmer will incur losses.





MAKING POULTRY FEEDS



Nutritional Composition Required by Chickens in Their Food

Some of the minerals needed in general chicken feed are zinc, copper, iodine, magnesium, calcium, sodium (0.15%, also equal to 0.37% sodium chloride), phosphorus, potassium, manganese, and iron. Some of the vitamins needed by chickens that must be in their feed are Vitamin E, Vitamin D, Vitamin A, Vitamin K, Thiamine, Niacin, Pyridoxine, Riboflavin, Pantothenic acid, biotin, Vitamin B12, choline and folacin.

When formulating and mixing your own backyard chicken feed, the following method will help you determine the amount of energy and protein ingredients needed in the feed.

1. Draw a square
2. In the center of the square, write the protein content desired in the final mixture (such as 20%)
3. At the upper LEFT hand corner write “corn” and its protein content (9%)
4. At the lower LEFT hand corner, write “supplement” and its protein content (40%)
5. Subtract diagonally across the square (the smaller from the larger) and enter (in the corners) the results on the RIGHT hand side ($20-9=11$; $40-20=20$)
6. The number at the upper RIGHT hand corner gives the parts of corn, and in the lower RIGHT hand corner you have the parts of supplement needed to make a mixture with 20 percent protein. Thus, 20 parts of corn mixed with 11 parts of supplement gives 31 parts of feed with 20 percent protein.
7. To convert this to a percentage basis, divide 20 by 31 and multiply the result by 100. The ending result, 64.5 percent, indicated the amount of corn that will be used. The supplement is represented by the remaining percent (35.5).

Feed Needed at a Chicken's Different Stages of Growth

For the most part, chicks from 28 days of age and up are fed a “starter ration.” This ration contains high levels of protein (approximately 22 percent) to give the chicks the energy they need to grow and develop properly. From eight weeks of age and up to when they start laying (usually around six months of age), the pullets are fed a grower ration containing about 17 percent protein. Once laying commences, layer ration is fed to them.



Chicken feeding on a trough. Always ensure the trough hygiene is maintained

The Importance of Fresh Water

Chickens aren't camels! Just like the human body, the body of the chicken consists of mostly water. Thus, though water is not often considered a “food” or “nutrient,” it's one of the most important things to consider when feeding your backyard chickens. Always ensure your chickens have access to fresh, clean and cool water at all times of the day, and clean your watering equipment regularly as dirty waterers can harbor diseases and attract pests. You can use simple trough-style waterers, floor-based waterers and/or hanging waterers, depending on how your chicken coop is set up

Poultry Nutrient Requirements

Criteria	Pullets				Layers		
	Starter	Grower	Developer	Peak	Post Peak	Midcycle	Late Cycle
ME* Kcal/kg	2915	2860	2816	2926	2860+	2860 -	2816
ME Kcal/lb	1325	1300	1280	1330	1300 +	1300 -	1280
Crude Protein %	20.0	17.5	15.0	18.0	17.5	16.5	15.0
Lysine %	1.03	0.83	0.58	0.88	0.82	0.78	0.73
Methionine %	0.36	0.32	0.25	0.42	0.40	0.38	0.35
TSAA** %	0.69	0.61	0.50	0.70	0.67	0.63	0.60
Calcium %	0.95	0.95	0.95	3.85	3.85	3.90	4.00
NP*** Phosphorus %	0.45	0.40	0.37	0.42	0.35	0.32	0.28
Sodium %	0.20	0.20	0.20	0.20	0.18	0.18	0.18
Chloride %	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Choline g/kg	1.65	1.10	0.88	1.65	1.32	1.10	0.88
Weeks in feed	0-6	6 to 12	12 to 18				
Kg of feed Intake	1.1	2.0	2.6	% Egg Production			
				> 90%	85-90%	80-85%	<80%

*Metabolizable Energy
 **Total Sulfur Amino Acids
 ***Non-Phytate

Supplements Scratch Grains

Chickens are compelled to scratch at the ground. They use their toes to mix up litter or scrape the ground in search of various seeds, greens, grit, or insects to eat. Spreading scratch grains (cracked, rolled, or whole grains such as corn, barley, oats, or wheat) encourages this behavior. Scratch grains are relatively low in protein and high in energy or fiber, depending on which grain is used. When scratch grains are fed with complete feeds, they dilute the nutrition levels in the carefully formulated diets. Scratch grains are like french fries—chickens that eat too many scratch grains have less of an appetite for more nutritious feed. If you are using scratch grains, feed them to chickens in the afternoon after birds have eaten complete feed, and then provide only as much scratch grains as chickens can finish in 15 to 20 minutes.

When feeding scratch grains to chickens, it is also important to provide grit to help the chickens grind and digest the grains properly (since chickens do not have teeth). If chickens have access to the ground, they can typically find enough grit in the form of small rocks or pebbles, but it is helpful to supply commercial grit, which is available in chick or hen size. Fine gravel is an acceptable substitute for commercial grit. Oyster shell should not be used as grit since it is too soft and does not aid in grinding. In addition, growing chickens have a lower calcium requirement, and too much calcium can adversely affect their kidneys.

Grit should also be provided to pasture-raised chickens. Grit is important for breaking down the grass chickens consume.

Table Scraps

Chickens are often fed table scraps (peelings, stale bread, and leafy vegetables) as treats, but excessive table scraps and greens can adversely affect egg production. The total supplementation of table scraps and scratch grains should be no more than chickens can finish

in 20 minutes. Make sure that the scraps are not allowed to rot, or botulism might result. It is also recommended that scraps with strong taste, such as onions, not be fed to laying hens because eggs might take on those flavors. Sour milk can also be fed to chickens.

Clippings

The amount of complete feed consumed can be reduced by supplementing with pasture or lawn clippings. Young, tender plants are a valuable source of nutrients for chickens, but chickens are not able to digest old, fibrous plants. Do not feed grass clippings from lawns if pesticides have been recently applied.

Medicated Feeds

Medicated poultry feeds, which typically contain a coccidiostat and/or an antibiotic, are available. Coccidiosis can be hard to control through sanitation practices alone. Chickens benefit from being fed a coccidiostat at low levels. Mature chickens develop a resistance to coccidiosis if allowed to contract a mild infection of the disease. Chickens raised for replacement can be fed a coccidiostat-containing feed for the first 16 weeks of life. The medicated feed should then be switched to a nonmedicated feed.

Medicated feeds are not typically fed to laying hens. Examples of coccidiostats added to poultry diets include monensin, lasalocid, amprolium, and salinomycin. Examples of antibiotics added to feed include bacitracin, chlortetracycline, and oxytetracycline. Be sure to check the feed label for any warnings concerning the medication used in the feeds. Monensin, for example, can be toxic to horses.

Feeding and Storage

The way the chickens are fed is as important as the feed itself. Supply enough feeder space for all the chickens to eat at one time. With limited feeder space, some chickens do not get enough to eat. Place the feeders so that the trough is at the level of the chickens' backs.

This will reduce feed spillage. If bantams and large fowl are being fed from the same feeder, adjust the feeder to the height of the bantams.

Feed should not be stored for more than two months. It is also important to keep it in dry, cool place. Old feed can lose its nutritional value and is susceptible to mold.

Replacement Pullets

The manner in which a pullet is raised to sexual maturity will have a lasting effect on the productive life of the hen. Pullets are grown to reach a certain body weight at a specific age. Many of the problems that occur in a laying flock can be traced back to insufficient body weight during the growing period.

Commercially raised pullets receive three diets during the growing phase: starter, grower, and developer. Most feed stores sell only one or two types of feeds for raising replacement pullets.

Feeds account for more than 80 per cent of poultry production costs. A farmer who manages to bring down this cost to about 50 to 60 per cent stands to make good returns in the poultry business. Farmers who formulate and make their own feeds at home save an average ranging from Ksh 840 for every 70kg bag of chicken feed, which is a great saving for those doing commercial production.

Below, we give farmers some guidance on what they need to be able to formulate their own feeds and cut down their production costs:



Preparing layers chick mash (1-4 weeks)

Since they are growing, chicks require feed with Digestible Crude Protein (DCP) of between 18 to 20 per cent. Amino acids are important additives in all feeds in order to make a complete feed for all animals. For hybrid chickens the addition of amino acids is very important to maintain a balanced diet for fast growth.

Chick placement

1. Prior to delivery of chicks, clean and disinfect the premises. Check all equipment to be sure it is working properly and in the correct position for the baby chicks. See that vermin controls are in place, isolated from the chicks.
2. Place feed in the building the day prior to delivery. Set heating to match type of pullet rearing system. Check and adjust water system, which has been properly disinfected and flushed.
3. On delivery day, check that all waterers are full and brooding temperatures are correct. Trigger water cups or nipples as chicks are placed. Feed should be placed on paper in cages or in shallow containers around full feeders. Keep light at high intensity for 22 hours the first two days.

The following ingredients can be used to make a 70 kg bag of chick mash:

31.5kg of whole maize

9.1kg of wheat bran

7.0 kg of wheat pollard

16.8 kg of sunflower (or 16.8 kg of linseed)

1.5 kg of fishmeal

1.75 kg of lime

30g of salt

20g of premix Amino acids

70g of tryptophan

3.0g of lysine

10g of methionine

70 g of threonine

50g of enzymes

60g of coccidiostat

50g of toxin binder

To make a 70 kg bag growers feed (1 to 8 weeks)

It is important to remember that pullets or young layers should be provided with feed having a protein content of between 16 and 18 per cent. Such feed makes the pullet to grow fast and prepare for egg laying.

NB: Layers' feed should never be fed to chickens younger than 18 weeks as it contains calcium that can damage their body organs such as kidneys (they can develop kidney stones), which interfere with egg production and also shorten their lifespan. Grit (sand) should be provided to growers that are not on free range to aid in digestion.

FORMULATING FEED FOR LAYERS

If you're raising layer hens: From when your chicks hatch until six weeks of age, feed your chicks a starter feed that has a protein level of 20-22 percent. Once the chicks hit six weeks of age, feed them pullet grower (14 to 16 percent protein) until age 20 weeks. After that, switch your hens to layer feed with a protein level of 15 to 18 percent

Feeding Amounts (Fat Hens Aren't Happy Hens!)



The amount of food your chicken eats will go up or down depending on your chicken's age and your method of feeding him. Some chicken hobbyists leave the chicken feed out all day in a sort of buffet-style setup so that their hens can eat whenever they whimsy strikes. Other hobbyists dole out the feed in measured proportions two or three times daily.

Energy

A constant supply of energy is necessary for all birds to sustain life. Energy for all the birds systems comes from the feed they eat or their body stores. The oxidation of nutrients is the process by which organic matter in the feed is converted to carbon dioxide and water, releasing the energy required to support life.

Fats and Oils

These are the most concentrated sources of energy. On a per unit of weight basis, they have more than twice the energy which can be derived from a similar amount of carbohydrates (CHO) or protein. The energy is readily available to the bird whether growth or reproduction is the criteria measured. Fats and oils provide an essential fatty acid, linoleic acid. There are some physical properties which provide additional benefits. Because fats are typically applied as liquid there is a reduction in fines and dust. There is also a general palatability improvement with fat additions.

Carbohydrates

Carbohydrates are organic compounds composed of Carbon, Hydrogen, and Oxygen (CHO). As they make up $\frac{3}{4}$ of the dry weight of grains, carbohydrates are a large part of the bird's ration. They serve as a source of heat as well as energy in the bird's body. Finally, they can be transformed into fat, adipose tissue, and stored in the body. The insoluble and indigestible CHO from the structural portion is called fiber. The soluble and digestible CHO portion is labeled nitrogen-free extract (NFE). Glucose is stored in the liver as glycogen, which then regulates the level of glucose in the blood.

Protein (Amino Acids)

Amino acid requirements have been defined for each specie as well as age and function within each specie. Protein nutrition has precise amino acid levels, but the ingredients available don't always fit the precise needs of any bird. It is the level of the limiting amino acid which determines how much the bird will have at its

disposal for growth, tissue replacement, feathers, eggs and other amino acid-based needs of the body. Another factor in formulating a ration is that the digestibility of amino acids from any ingredient is not 100 percent. Bear in mind, too, that genetic changes cause a change in amino acid requirements.

Today, the amount of waste and manure production has become regulated by governmental agencies, and therefore rations must be formulated to limit excess protein.

Minerals (Macro & Trace)

Macro-minerals are defined as those inorganic elements required by the bird as a percentage of the diet. Calcium and phosphorus are required for the skeleton. Sodium, potassium, and chloride help maintain the osmotic and pH relationships in the body.

Trace minerals are listed in terms of parts per million (ppm) and function within the body processes. Poultry research has worked out digestibility and interaction data between the inorganic elements. Here again, environmental factors indicate that excretion of excess or indigestible minerals, such as phosphorus, copper, and zinc, can have a negative effect on the environment.

Vitamins

These are organic compounds, which are essential for health, growth and maintenance of the body. While they are needed in minute amounts, they must be supplied in the diet to avoid a deficiency disease or metabolic syndrome. There are a number of substances and conditions, which can interfere with vitamin absorption. Mycotoxins, cocci, and organisms, which cause enteritis, will result in failure of vitamin absorption and therefore a “vitamin deficiency.”

Making a 70 kg bag of layers' mash (18 weeks and above)

34kg of whole maize

12kg of Soya

8kg of fishmeal

**10kg of maize bran, rice germ or
wheat bran**

6 kg of lime

175g premix Amino acids

70g lysine

35g methionine

70kg tryonine

35g tryptophan

50g toxin binder

Layer feed should contain a

Digestible Crude Protein (DCP) content of between 16-18 per cent. The feed should contain calcium for the formation of eggshells (Laying hens that do not get enough calcium will use the calcium stored in their own born tissue to produce eggshells). Layer feed should be introduced at 18 weeks.

Formulating a 70 kg bag of broiler feed

The feeding schedule for broilers is quite flexible. Although some producers feed chicken grower from hatch to slaughter, most use a two- or three-stage feeding program, changing the feed as chicks mature. Young chicks grow rapidly and need high levels of protein. As they mature, the rate of growth slows down and their protein needs are lower. Consequently, the feed program involves a reduction in protein levels from chicken starter to chicken grower and then to chicken finisher.

Growth rates

Rates of feed consumption and growth are affected by many factors, such as the breed, the management system, and even the weather. For example, free-ranging Rhode Island Reds will likely eat far less and gain weight more slowly than a confined flock of White Cornish Crosses. Even with the same breed and management system, the rates of feed consumption and weight gain will vary. In uninsulated barns, cool weather will cause birds to eat more and grow slowly, whereas excessive heat will make them sluggish, reducing their appetite and growth rates. With free-ranging birds, their growth rates will also depend on the amount of available forage.

Broiler Starter Feeds The objective of the starter/brooding period (0 to 10 days of age) is to establish good appetite and achieve maximum early growth. The target is to achieve a seven-day body weight of 170 g or above. Broiler Starter should be given for ten days. The Starter represents a small proportion of the total feed cost and decisions on Starter formulation should be based on performance and profitability rather than cost. The digestible amino acid levels in the feed are important aspects and must be considered when purchasing feed. In wheat-feeding areas

the use of some maize may be beneficial. Total fat levels should be kept low (<5%) and saturated fats should be avoided, especially in combination with wheat.

Broilers have different feed requirements in terms of energy, proteins and minerals during different stages of their growth. It is important that farmers adapt feed rations to these requirements for maximum production. Young broilers have a high protein requirement for the development of muscles, feathers, etc. As the broilers grow, their energy requirements for the deposit of fat increase and their protein requirements decrease. They

therefore require high protein content in their starter rations than in the grower and finisher rations.

Broilers should have feed that has between 22 – 24 per cent DCP. The following guidelines can help the farmer to make the right feed at each stage of growth:

Broiler Grower Feeds Broiler Grower feed will normally be fed for 14 to 16 days. The transition from Starter feed to Grower feed will involve a change of texture from crumbs to pellets.

There is a continuing need for a good quality Grower feed to maximize performance. **Broiler Finisher Feeds** Broiler Finisher feeds account for the major cost of feeding and economic principles should be applied to the design of these feeds.

Changes in body composition can be rapid during this period and excessive fat deposition and loss of breast meat yield need to be carefully considered.

Preparing broiler growers feed (70kg) A drum mixer is good for mixing home made feeds

**10kg of whole maize
16.7kg of maize germ
13.3kg of wheat pollard
10 kg wheat bran
6 kg of cotton seed cake
4.7kg of sunflower cake
3kg of fishmeal 2kg of lime
3.4kg of soya meal
40g of bone meal
10g of grower PMX
5g of salt
5g of coccidiostat
5g of Zinbcitrach
Broiler starter feed (1-4 weeks)
40kg of whole maize
12kg of fishmeal (or omena)
14kg of soya bean meal
4kg of lime
70g of premix
Amino acids
35g of lysine
35g of threonine**

Important tips on feed preparation

- When making home made feed rations, it is important to do experimental trials, by isolating a number of chickens, feeding them and observing their performance. If the feed rations are right, the broilers will grow fast and layer will increase egg production (at least 1 egg after every 27 hours).
- Farmers should be very careful with the quality of feed ingredients or raw materials. Chickens are very sensitive to feeds that contain mycotoxins which are present in most of the raw materials. Never use rotten maize to make chicken feed.
- Buy quality fishmeal from reputable companies. If omena is used the farmers must be sure of its quality; most of the omena in the open-air markets may be contaminated.
- It is very important to mix all the micronutrients (amino acids) first before mixing with the rest of the feed.
- For mixing, farmers are advised to use a drum mixer (many jua kali artisans can make one). Never use a shovel to mix feed because the ingredients will be unevenly distributed.
- Spoilt maize is the main source of animal feed in Kenya. Such feed is dangerous as it ends up in human food in eggs, meat and even milk from dairy cows and goats.
 - It is easier for small-scale farmers working in groups to buy some of the ingredients such as pre-mixes and amino acids after which they can share the product according to each one's contribution.

The Pearson Square method of Feed making:

Relies on the Digestible Crude Protein (DCP) as the basic nutritional requirement for feed. The most common ingredients used are whole maize, maize germ, cotton seed cake, soya beans, sunflower or omena (fishmeal).

Example 1: Feed for Layers

Assuming that the farmer wants to make feed for their chickens using the Pearson Square method, they have to know the crude protein content of each of the ingredients used in feed making. The farmer may use whole maize (8.23 % DCP) Soya (45 % DCP) Omena (55 % DCP) and maize bran (7 % DCP) Sunflower (35 % DCP). To make a 70 kg bag of feed for layers, a farmer would require the following ingredients:

34 kg of whole maize

12 kg of Soya

8 kg of omena

10 kg of maize bran

6 kg of Lime (as a calcium source)

Each category of chickens has its own requirements in terms of nutrition. For example, feed for layers should have at least 18 per cent crude protein. If one were to formulate feed for layers, then they would have to calculate the percentage of digestible crude protein in each of the ingredients to ensure that the total crude protein content is at least 18 per cent to meet this nutritional requirement.

To find out if the feed meets this standard, a farmer can do a simple calculation as follows:

Whole maize = $34 \text{ kg} \times 8.23 \div 100 = 2.80 \text{ kg}$

Soya bean = $12 \text{ kg} \times 45 \div 100 = 5.40 \text{ kg}$

Omena = $8 \text{ kg} \times 55 \div 100 = 4.40 \text{ kg}$

Maize bran = $10 \text{ kg} \times 7 \div 100 = 0.70 \text{ kg}$

Lime = $6 \text{ kg} \times 0 \div 100 = 0.00 \text{ kg}$

(Total crude protein 13.30 kg)

To get the total crude protein content of all these ingredients in a 70

kg bag, you take the total crude protein content of the combined ingredients, divide by 70 and multiply by 100 thus, $(13.30 \div 70) \times 100 = 19.0\%$. This shows that the crude protein percentage in the above feed formulation is 19.0 % which is suitable for layers. Before mixing the feed, whole maize including the other ingredients has to be broken into the right sizes through crushing or milling to make it palatable for the chickens. Add 250 g of table salt on every 70 kg bag of feed.

(Total crude protein 13.30 kg)

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Feed for chickens meant for meat.

Chickens meant for meat production require feed with a higher content of DCP. From the first to the fourth week, the chicks require feed with a DCP content of between 22 to 24 percent. From the fourth to the eighth week, the chicks require feed with a protein content of 21 to 22 per cent crude protein. To attain this requirement, farmers can formulate feed using the same method given above. To make a 70 kg bags of feed, they will need to have all the right the ingredients in the proportions given below:

Whole maize = $40 \text{ kg} \times 8.23 \div 100 = 3.20 \text{ kg}$

Omena = $12 \text{ kg} \times 55 \div 100 = 6.60 \text{ kg}$

Soya beans = $14 \text{ kg} \times 45 \div 100 = 6.30$

kg Lime = $4 \text{ kg} \times 0 \div 100 = 0.00 \text{ kg}$ (Total crude protein 16.10 kg)

To determine if a 70 kg bag of feed has adequate crude protein content for birds meant for meat production, the same methods is used: $(16.10 \div 70) \times 100 = 23\%$. The feed given in this example has a total crude protein content of 23 % which is adequate to feed chicken in this category. In every 70 kg bag of feed, add 250g of table salt.

Ration for kienyeji chickens

Indigenous chickens are less productive in terms of egg and meat increase. They may not require intensive feeding and management.

For this category of chickens, farmers can constitute feeds with a

DCP of between 15 – 16 %. They can use the following formulation to make feeds for the indigenous chickens:

Whole maize = $33 \text{ kg} \times 8.23 \div 100 = 2.70 \text{ kg}$

Maize or wheat bran = $14 \text{ kg} \times 7 \div 100 = 0.98 \text{ kg}$

Omena = $7 \text{ kg} \times 55 \div 100 = 3.85 \text{ kg}$

Soya = $7 \text{ kg} \times 45 \div 100 = 3.15 \text{ kg}$

Lime = $5 \text{ kg} \times 0 \div 100 = 0.00 \text{ kg}$

(Total crude protein 10.68 kg)

Percentage of total crude Protein in the ingredients = $(10.68 \div 70) \times 100 = 15.25 \%$

For farmers rearing hybrid layers and broilers, it is advisable to buy already constituted feeds from reputable companies that sell quality feed. The main reason is that it is very difficult for farmers to constitute micronutrients such as amino-acids, trace minerals, fat and water soluble vitamins that these breeds of chicken require for proper growth.

Some tips on how to feed chicken An egg-laying chicken requires 130 g of feed per day (provide clean water at all times). 1 chick requires 2.2 kg of feed for 8 weeks (thus 100 chicks = 2.2 kg x 100=220 kg. Chicks should be allowed to feed continuously and given adequate clean water at all times).

If they finish their daily rations, give them fruit and vegetables cuttings to feed on.

1 pullet (young chicken about to start laying) should be fed 4.5 kg of feed for two and a half months until the first egg is seen. It should then be put on layer diet. Supplement with vegetables, edible plant leaves or fruits peelings in addition to the daily feed rations.

All ingredients used must be of high quality and palatable. Never use rotten maize Chickens are very susceptible to aflatoxins poisoning.

When using omena as an ingredient, ensure it is free of sand and seashells.

Raw material suppliers.

Raw material suppliers Farmers who need raw materials for feed making including feed additives (pre-mixes and amino acids) can order them from the following companies:

1. Essential Drugs Ltd, E.D.L
House, Mombasa Rd, Tel. 020 263 2701/02, 0721 386 604
email: info@essential-drugs.com

2. Tarime suppliers Tel. 0729 099550, City stadium, Nairobi,
Email: tarimesuppliers@yahoo.com.



