

Chicken nutrition

In the same way that it would not be recommended to feed kitten food to senior cats or puppy food to elderly dogs, hens require different food throughout their lives. Essentially hen food is divided into:

- Baby chick crumbs or mash
- Grower pellets or mash
- Layers crumb mash or pellets
- Specialised feeds for bantams/fancy hens and cockerels
- Medicated feeds.

This article will concentrate on the nutritional needs of the commercial laying hen and backyard ex commercial hens. Commercial broiler birds have their own particular requirements.

For the first 6 to 8 weeks of life chicks are fed on chick crumb or mash. Rearing diets are designed to meet the nutrient requirements of a growing bird, which develops in a sequential fashion, with the respiratory and digestive systems being primary, followed by skeletal growth, feather, muscle and fat. The growth rate of a layer type pullet (a pullet bred specifically for the egg laying industry as opposed to a broiler pullet which reaches maturity and slaughter weight between 5 and 7 weeks of age) is relatively slow and therefore the diets are of medium energy density, with a falling protein content through the series of starter to grower diets, which reflect the increasing feed consumption capacity and decreasing rate of daily gain of hens (*Figure 1*).

As the bird reaches maturity, skeletal growth should be completed with particular development of the medullary bones which hold a reserve pool of calcium for the bird to draw on and replenish for egg shell deposition in the hours when she is not feeding. Precocious layer type breeds reach sexual maturity prior to their attainment of mature bodyweight and so at the onset of lay, the bird requires a diet that will deliver sufficient nutrient, particularly energy (calories), to support both body growth and egg production. A couple of months into lay body growth should plateau and the mature hen can then be fed a diet a little lower in energy to support a persistent laying cycle (Fothergill, 2015) (*Table 1*).

Typical content for chick starter feed is:

- Oil 3.5%
- Protein 18.0%

Abstract

The growing popularity of hen keeping has resulted in an ever growing hen feed industry. The days of backyard hens living off a handful of grain or kitchen scraps have long gone and the responsible chicken keeper is now faced with a bewildering array of different feeds and often no idea which to choose.

Key words: commercial, growth, nutrition, pellets, supplements

- Fibre 4.50%
- Ash 6.0%
- Methionine 0.36%.

While poultry grower feed differs slightly:

- Oil 3.5%
- Protein 16.0%
- Fibre 4.5%
- Ash 5.5%
- Methionine 0.30% (BOCM Pauls, 2015).

The contents of layer's feed is outlined in the *Nutritional content* section below.

Birds are classed as growers between 9 weeks and 20 weeks and typically begin to lay at 21 weeks until 72 weeks.

As a general rule farmers feed crumb or mash to chicks and later to adult hens rather than pellets. Hens take longer to eat crumb than pellets and are therefore occupied for a longer period of the day. Chicks find the size of the crumb easier to eat.

In a commercial setting the feed is provided ad-lib. Feed intake is influenced by the ingredients, presentation (pellets, crumbs, mash, grain and free range material), taste and nutritive value, the breed, age and sex of the stock and environmental factors (Pattison, 2008). Each manufacturer provides a feeding guide on their individual product.

Nutritional content

Ingredients vary from manufacturer to manufacturer but most commercially produced feed will contain

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Figure 1. Chicks have their own specific requirements.

wheat, calcium carbonate, maize, soya, sunflower seed, and salt. Often shell grit, marigold flowers and yeast are added: shell grit aids in the initial phase of food break down in the gizzard; marigold flowers influence the intensity of yellow in the yolk; and yeast is added as a protein source. Before the 1980s, chickens were often fed scraps, with a little wheat or oats, sometimes maize, fishmeal for protein, and cod liver oil, however modern research has been able to provide us with mash or pelleted feeds that contain the right balance of nutrients for chickens which scraps did not.

Protein

Protein is the most important part of the hen's diet — it is a body building material essential for the formation of flesh, blood, feathers, skin, bone and eggs. Most commercial hen feeds contain between 13 and 16% protein. Laying hens that are not receiving sufficient protein in their diet will usually stop laying or try to get the extra protein they need by starting to feather pick since feathers contain protein. It is recommended that layers' pellets are fed 2 weeks

before expected start of lay to provide sufficient calcium for shell production and quality.

Ash

Ash is the mineral part of the diet. Hens need calcium, cobalt, iron, chlorine, copper, magnesium, manganese, phosphorus, potassium, sodium, sulphur and zinc. Ash is vital for maintaining strong bones and egg shell.

Oils and fats

These are concentrated sources of energy and a source of essential fatty acids. Fats improve digestibility of some protein rich feeds and improve palatability. Types of oils used include sunflower, rapeseed, olive and soybean. Fats are generally sourced from feed grade animal fats.

Fibre

In hens fibre is mostly for bulk and to help the passage of feed through the intestinal tract. It is a mix of complex carbohydrate and is of very little nutritional value to most hens. Higher fibre has been found to be beneficial in commercial pullet rearing to prevent injurious pecking. Getting the balance of fibre to protein content right can be a problem for feed manufacturers as poorer quality vegetable proteins with higher fibre content are likely to have a poorer amino acid balance (Bray, 2013).

Medicated feed

Feed is available pre medicated with the wormer flubendazole (Flubenvet, Elanco; Flubenvet is the only licensed in feed wormer for chickens) from Mariage feeds or Heygates. Commercially Flubenvet is added as dry mix at registered feed mills. To produce a 5% w/w premix feed, Flubenvet is added at a rate of 600 g Flubenvet incorporated into 1 tonne of feeding stuff. Backyard hen keepers can purchase Flubenvet in a quantity to treat 20 hens over 7 consecutive days. It can prove difficult to incorporate the powder into the normal diet, but the use of a small quantity of vegetable oil to stick the medicine to hen pellets will usually be sufficient to encourage the hens to eat it. Elanco make no recommendations as to desired frequency of use. St David's Poultry Team in Devon advise worming 3–4 times per year, but in the author's opinion for most small backyard flocks it is adequate to worm twice yearly. There is no egg withdrawal period. Flubenvet can be used to treat most of the common poultry worms including:

- *Syngamus trachea* (gapeworm)
- *Hererakis gallinarium* (caecal worm)
- *Trichostrongylus tenuis*

Table 1. illustrating life stage changes to nutritional requirements

Age of bird and life stage	Oils/fats	Protein	Fibre	Ash
Chick (6 weeks to 8 weeks of age)	3.5 %	18.0%	4.5%	6.0%
Growers (9 weeks to 20 weeks of age)	3.5%	16.0%	4.5%	5.5%
Layers (21 weeks to 72 weeks of age)	2.7%	16.0%	5.5%	12.5%
End of lay (72 weeks onwards)	4.0%	16.0%	4.0%	14.0%

- *Capillaria* spp. (hair worm)
- *Amidostomum anseris* (gizzard worm)
- *Ascaridia galli* (large round worm) (Noah, 2015).

The use of feed with a coccidostat (an antiprotozoal agent that acts on *Coccidia* parasites) is not recommended. Chick vaccination at 1 day old with Paracox (MSD) provides lifelong protection for coccidiosis.

Antibiotics may only be added to feed if prescribed for a specific condition by a veterinary surgeon.

Commercial diets for ex commercial hens (ex bats)

At 72 weeks of age commercial hens are regarded as spent or end of lay. It is commercially unrealistic for farmers to put their hens through a moult (the process where hens go off lay and usually grow a new set of feathers) and in a competitive market they need every hen to be laying to her maximum potential. Prior to 2012 hens were housed in barren battery cages with little opportunity to move around. On being released from the cage system and given a free range environment, some hens had difficulty with bone strength due to calcium deficiency (Patison, 2008). In January 2009 a specific feed was developed by Allen and Page as part of their small holder range (with input from the British Hen Welfare Trust (BHWT)). This feed met the needs of the hens at that period of time and anecdotal evidence suggests that Allen and Page Ex Bat Crumbs and Pellets was very successful. Changes to the cage system in 2012 have resulted in hens with different requirements and ex bats no longer need a dedicated feed, as a result the feed was withdrawn from sale in February 2014. Allen and Page now produce Natural Free Range Layers crumble and pellets and this has proved successful both as a transitional feed (cage to free range) and long term (Figure 2). The A&P layers' crumble is slightly coarser in texture than standard layers' mash which is a more powdery feed. The A&P pellets are much smaller than standard pellets. This enables the birds to transition from the layers' mash fed in commercial units to the larger pellets which make up most brands of pelleted feed. The small holder range is produced in a drug-free mill to prevent contamination with antibiotics and growth promoters. It is free from hexane (a chemical solvent used to extract vegetable oils from crops such as soybeans) and contains no genetically modified (GM) ingredients (Parrot, 2015). Many other excellent feeds are available — Dodson and Horrell, and BOCM Pauls to name just two produce feed for every life stage. Increasingly consumers are sourcing or-



Photo: Allen & Page

Figure 2. Commercially produced layers' crumble.

ganic feeds and the Organic Feed Company provides a range of feeds to cover this sector.

Treats and supplements

Owners of re-homed commercial laying hens may be driven by compassion for their often outwardly feather-bare appearance, to spoil their new family members with treats that they would not have encountered before. As a result the delicate nutritional balance is disrupted resulting in many cases in the hens going off lay. The advent of nutritionally balanced hen treats has to some extent prevented this outcome (Figure 3), but hen owners may find themselves supplementing the daily feed with tonics and supplements to encourage the hens back into lay. Ideally a laying hen will have eaten sufficient food by midday to provide 80% of her nutritional requirement. Feeding too many treats to hens causes obesity and it is the biggest mistake most hen owners make with regards to nutrition.

Grain is classed as a treat and should never be fed exclusively. Mixed corn is usually a mixture of wheat (80–90%) and cracked maize (10–20%). Wheat contains around 10% protein which is an insufficient amount of protein for a hen to be able to produce eggs (Daniels, 2008). Mixed corn is low in protein, high in fat and lacks essential vitamins and minerals that are required by chickens. It is not suitable for feeding in the warmer months as it is very heating and may cause feather pecking. In the winter no more than an eggcupful per day of treat should be fed per hen (preferably whole wheat rather than mixed corn) and it can be useful scattered to encourage foraging and exercise (Figure 4).



Figure 3. Enjoying a commercial Hentastic treat (Uni-pet).



Figure 4. A small amount of corn can encourage foraging behaviour.

Anecdotal evidence suggests that supplements such as apple cider vinegar (ACV) do help to maintain good health but this is not evidence based. ACV is made using the whole apple and provides enzymes

and important minerals and vitamins in the form of bioflavonoids. Anecdotally, hens receiving ACV have been shown to re-grow feathers faster than those not receiving it — making it an ideal supplement for recovering ex-bats. A seaweed supplement, however, provides more iodine than ACV and helps to assist in keratin production. In addition it can aid digestion, helping to break down minerals and fats by assisting the assimilation of proteins, converting food better and preventing sour crop. Sour crop is a yeast infection that affects the lining of the crop causing a build-up of foul smelling fluid in the crop leading to loss of appetite, loss of condition and in extreme cases death. ACV also helps lower the pH level in the digestive tract rendering it less welcoming to pathogens. It is important to stress that ACV should never be provided in metal drinkers due to the possibility of zinc toxicity and should be provided 1 week per month (5 ml ACV to 300 ml water), not continually.

ACV can also help to regulate the potassium levels in the body as it is a natural source. Potassium controls the use of calcium in the body allowing more calcium to be freely available to prevent soft shells. ACV clears the respiratory tract, helps to clean the hen's plumage and generally improves the hen's wellbeing.

Feed for malnourished or sick hens

Malnourished or sick hens benefit from a simple good quality layers' mash or crumble with a small amount of oats added. When made into a warm wet mash it is usually well accepted. Once veterinary advice to diagnose any specific problem has been sought and any prescribed treatment given, a probiotic is helpful; for example, Beryl's Friendly Bacteria ((Lallemand Animal Nutrition UK Ltd) or Avipro Avian (Vetark).

Kitchen scraps

Gone are the days of feeding leftovers to hens. Following the foot and mouth outbreak of 2001 it is illegal to feed kitchen waste including vegetable scraps. Catering waste must never be used as farm animal feed, regardless of whether it's vegetable or meat based or whether it comes from restaurants, households, or other sites (Animal Health and Veterinary Laboratories Agency, 2014). The main thrust of the legislation hinges on the risk of the scraps coming into contact with unacceptable forms or levels of animal proteins within the kitchen environment (unless it is a vegan kitchen) (Cawthray, 2013). There is no restriction on pulling up vegetables from the hen keeper's garden and feeding directly to the hens.

Key Points

- The nutritional needs of chicks, laying hens and end of lay hens are met by a range of products tailored to that life stage.
- Medicated feed containing a licensed wormer allows hen keepers to administer an accurate dose of product.
- Treats should only be fed in moderation as they have limited nutritional value.
- It is illegal to feed kitchen scraps unless the household is 100% vegan, but vegetables straight from the garden are permitted.
- Protein, ash, oils and fats, and fibre are essential for the feather and skin condition, maintaining strong bones and ensuring good egg shell quality.

Conclusion

A commercial hen is designed by nature to be an egg laying machine. In order for her to produce tasty eggs with strong shells she needs the correct balance of nutrients in her diet. As more hens live into retire-

ment their egg laying capacity will lessen but their nutritional needs still need to be met. Just because a hen has finished her egg laying days, does not mean her diet should suffer. **VN**

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