Aviagen™ Turkeys

Feeding Guidelines for Nicholas and B.U.T. Heavy Lines

Nicholas

B.U.T.

FEEDING GUIDELINES FOR NICHOLAS AND B.U.T. HEAVY LINES

The nutritional guidelines provided in the following tables have been revised according to:

- the latest results from trials conducted as part of Aviagen's ongoing nutrition research programmes
- published scientific information
- current management practices
- the latest revision of the performance goals

The optimum feed programme for any stock will depend on many management, environmental and economic conditions that may differ from those under which the nutritional guidelines were tested. The nutritional guidelines are therefore intended for use as a guide only and should not be considered a guarantee with respect to body weight or other production targets.

Feeding Programmes

The recommended schedules split the turkeys life into seven phases. The objective is to provide the optimum balance of nutrients for the development of the turkey within that time period.

There may be good reasons to use different phases of feeding due to management and other issues so these guidelines can be regarded as a tool that can be used to construct feeding programmes that apply to each company's requirements.

The more diets there are in the feeding programme the more efficiently the feeding schedule will match the bird's requirements.

An Excel spreadsheet is available on the Aviagen Turkeys website that will the enable user to easily calculate a suitable feeding schedule based on the data shown in this booklet.

Feed Density

The recommended schedules split the turkeys life into seven phases. The objective is to provide the optimum balance of nutrients for the development of the turkey within that time period.

The guidelines in **Table 1** assume a fixed relationship between diet energy and nutrient levels in each phase. The decision on what energy density should be used needs to take into account several factors:

- **Economics**
  - current and future prices for feed and feed ingredients
  - current and future prices for sales of the meat and products
- **The objectives of the company or farmer**
  - lowest cost of liveweight production
  - least cost deboned breast meat
  - maximised yield from the facilities
  - lowest FCR
- **Health status of the turkeys**
  - in areas of high disease challenge higher density nutrition can help to support the turkeys during periods of risk.
  - in periods of enteric upset a lower density ration can reduce diarrhoea problems.
- **Weather conditions**
  - in hot weather feed intake may be reduced with a consequence of lower weights or meat yields.

Feed Composition

Energy

Turkeys require energy for growth of tissue, maintenance and activity. Carbohydrate sources, such as corn and wheat, and various fats or oils are the major source of energy in poultry feeds. Energy levels in diets are expressed in Megajoules (MJ/kg) or kilocalories (kcal/kg) of Metabolisable Energy (ME), as this represents the energy available to the turkey.

Protein

Feed proteins, such as those in cereals and soybean meal, are complex compounds which are broken down by digestion into amino acids. These amino acids are absorbed and assembled into body proteins which are used in the construction of body tissue, e.g. muscles, nerves, skin and feathers.

Dietary crude protein levels do not indicate the quality of the proteins in feed ingredients. Diet protein quality is based on the level, balance and digestibility of essential amino acids in the final mixed feed.

Macro Minerals

The provision of the correct levels of the major minerals in the appropriate balance is important for all turkeys. The macro minerals involved are calcium, phosphorus, sodium, potassium and chloride.

Calcium and Phosphorus:

Calcium influences growth, feed efficiency, bone development, leg health, nerve function and the immune system. It is vital that calcium is supplied in adequate quantities and on a consistent basis. Phosphorus, like calcium, is required in the correct form and quantity to optimise skeletal structure and growth.

Sodium, Potassium and Chloride:

These minerals are needed for general metabolic functions. Shortages can affect feed intake, growth and blood pH. Excess levels of these minerals result in increased water intake and subsequent poor litter quality.

Trace Minerals and Vitamins

Trace minerals and vitamins are needed for all metabolic functions. Appropriate vitamin and trace mineral supplementation depends on the feed ingredients used, the feed manufacture and on local circumstances. Due to differences in vitamin levels of various cereals, the level of supplementation of some vitamins must be modified. Accordingly, separate guidelines are usually proposed for some vitamins, depending on the cereals (e.g. wheat versus maize) upon which the diets are based. See **Table 3**.

Enzymes

Two types of enzyme are generally used in turkey diets:

NSP Enzymes:-

Cereals contain some none starch polysaccharides (NSP) as part of the carbohydrate complex. The type and levels of NSPs varies in different cereals: Rye having the highest levels and Maize the lowest. These NSPs cannot be readily digested by turkeys due to the lack of natural enzymes to break them down, and then they form complexes in the gut resulting in poorer digestion and problematic faeces.

The addition of NSP enzymes in the feed, targeted at the specific cereal being used, can improve digestion and release extra energy and minerals for absorption by the turkey.

Phytase Enzymes:-

Ingredients of plant origin contain a lot of phosphorus which is naturally bound into a Phytate molecule. Turkeys cannot access this phosphorus as they lack an enzyme to break down the complex.

Addition of a Phytase enzyme to the diet releases some of the phosphorus and calcium, which reduces the need to add additional minerals to the feed and reduces phosphate pollution if the litter is used as a fertilizer.

Feed Ingredients

Attention should also be paid to the quality and digestibility of dietary protein.

The inclusion of fishmeal in diets for young turkeys, where permitted under local regulations, helps to improve the amino acid balance and reduce the risks from over reliance on Soya. The use of ingredients with protein of poor digestibility should be restricted. Excess of undigested protein will be excreted causing an increased litter ammonia concentration. This may increase the incidence of breast condemnations or cause environmental nuisance.

Fats are an important energy source in turkey diets but young turkeys have a limited capacity to digest some of the fatty acids found in some types of fat. Generally the use of pure vegetable fats like Soyabean oil is recommended for starter diets and the proportion of lower quality fats or Blends with high levels of free fatty acids or high in palmitic or stearic acid should be restricted until the birds get older.

Table 4 shows guidelines for the inclusion of some feed ingredients.

Feed Structure

In the first 24 -72 hours it is very important to get the poults to consume as much food as possible. Early management in terms of feed presentation, lighting and temperature must encourage the poults to eat. To start the poults the diet needs to have enough structure to enable the young birds to pick up particles. If it is too fine and dusty then the poults may not be able to select enough particles and will not consume enough; however if the particles are too large then the poults will not be able to swallow them and so will not eat enough food to get them off to a good start.

The starter feed should be presented as a coarsely ground meal or a sieved crumble made from hard pellets of a maximum diameter of 3.5 mm. Small diameter pellets 1.5-2.0 mm can be used, but the pellets should not be longer than the diameter.

As the poults get older the grist or crumble size can be coarser, and small diameter pellets (3.5 mm) can be introduced after 21 days.

To manufacture good pellets and crumbles many feedmills will grind the ingredients to a fine powder to improve the cohesion when it is conditioned and pelleted. When the turkey consumes these pellets or crumbles the processed feed will dissolve into a fine paste in the crop when mixed with water, this then passes in the gizzard. The gizzard should act to further process the feed by grinding it down, but without any coarse structure the gizzard muscles do not develop and the enzyme production is low. Using coarsely ground cereals or adding whole or cracked grains of cereals to the diet will stimulate the gizzard to develop naturally and will increase enzyme production, improve food utilisation, improve litter conditions and help to reduce enteric problems.

Whole Grain

The addition of whole grain to the diets helps improve gut integrity and allows the producer some flexibility in adjusting diet composition and controlling cost.

There are different ways that whole grain is now used to feed turkeys:-

1. In a controlled way when grain is added at fixed levels and the diets are adjusted to take account of this so that the correct nutrient package is consumed. The inclusion of whole grains can be at the feedmill or on the farm using blending systems.

2. Another method is using whole grain to dilute the diet. This may be at controlled or uncontrolled levels. In a controlled programme a series of addition levels of the whole grain can be calculated to ensure the overall combination of feed and grain matches reasonably closely the turkeys' requirements. However in an uncontrolled programme the level added may be dictated by the farmers reaction to bird weight or performance. The level of grain added may be varied according to the desired outcome using on farm blending systems. Dilution of the diet can lead to suboptimal performance, but can also result in a reduced cost of gain. Such programmes need close coordination between growers and processors to achieve common objectives.

ADVANTAGES OF WHOLE GRAIN ADDITION

- Reduces feed cost by reducing milling charge and if added on farm reduces transport costs
- Less rations to be manufactured
- Fewer deliveries where on farm grain is used, since up to 25% of diet can be whole grain
- Improved gut health
- Better litter quality
- Lower FCR
- When added on-farm the levels can be adjusted based on actual performance levels, so that growth can be controlled
- Can be used to reduce growth in older males if there are risks of leg problems or heart attacks

DISADVANTAGES OF WHOLE GRAIN ADDITION

- Salmonella can be present in whole grain so the grain should be treated with organic acid
- On-farm grain stores must be vermin/water proof
- Blending systems are expensive, involving capital expenditure
- Wheat quality may vary and should be tested routinely (eg. moisture and specific weight)
- Growth rate may be reduced
- Breastmeat may be reduced if the diet is not balanced
- The gizzard increases in size leading to higher losses at processing
- Potential for contamination from grain in the processing plant
- Coccidiostat levels need to be adjusted in the feed to allow for dilution

FEEDING GUIDELINES FOR HEAVY LINES

Feeding Programme

In Table 1 the guideline amino acids and mineral levels for feeding to Aviagen Heavy line turkeys are shown. The nutrients are expressed as a function of the energy level of the feed expressed in g/Mj of metabolisable energy. The information is set out based on a 7 stage feeding programme for males and females. From this table the user can calculate feeding programmes to suit their own situation

Feed density is determined by the energy level of the feed. The selection of suitable energy levels should be based on many factors, such as market prices for feed ingredients, breast meat price, live bird price and desired performance level. These factors will be specific to individual companies and outside the scope of these guidelines.

Examples of a low, medium and high density programmes are shown in Tables 2A, 2B, 2C, to illustrate the sort of programmes that can be used in different situations. This information is based on a 7 stage feeding programme, but to suit local conditions and management practices it is possible to adjust the feeding ages to whatever is most suitable providing the guideline principles are followed. To help in this process a feed calculator has been developed and is described on Page 12 in more detail.

The more rations that are in the feeding programme the more efficiently the schedule will match the turkeys requirements. This may need to be balanced against practical considerations of producing and delivering many rations in a feedmill. However increased numbers of diets can be achieved without too much complication by blending diets or whole grain at the load point to increase ration numbers.

Diets for Females – in a combined growing system the females will usually receive the same diets and feeding programme as the males. There can be financial benefits from feeding a specific female ration or moving through the male diets more rapidly.

TABLE 1: FEEDING GUIDELINES FOR THE AVIAGEN HEAVY LINES NUTRIENTS as g / MJ ME

RATION NUMBER		1		2		3		4		5		6		7	
MALES	DAYS	0-21		22-42		43-63		64-84		85-105		106-126		127-147	
FEMALES	DAYS	0-21		22-42		43-56		57-70		71-84		85-98		99-126	
AMINO ACIDS		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
Lysine		1.48	1.41	1.29	1.21	1.12	1.03	0.97	0.89	0.83	0.76	0.72	0.66	0.61	0.56
Methionine		0.53	0.50	0.46	0.44	0.41	0.38	0.37	0.33	0.32	0.29	0.30	0.27	0.27	0.24
Methionine + Cystine		0.96	0.91	0.85	0.80	0.74	0.69	0.66	0.61	0.58	0.53	0.53	0.48	0.48	0.44
Tryptophan		0.21	0.20	0.20	0.19	0.18	0.17	0.15	0.15	0.15	0.13	0.14	0.12	0.14	0.11
Threonine		0.86	0.82	0.76	0.71	0.67	0.62	0.59	0.54	0.52	0.47	0.45	0.41	0.39	0.36
Arginine		1.51	1.43	1.32	1.24	1.15	1.07	1.00	0.92	0.85	0.79	0.75	0.68	0.64	0.59
Valine		0.99	0.94	0.87	0.82	0.77	0.71	0.67	0.63	0.59	0.54	0.52	0.47	0.45	0.42
iso-Leucine		0.90	0.86	0.78	0.74	0.69	0.64	0.60	0.55	0.52	0.48	0.46	0.42	0.40	0.36
MINERALS															
Calcium		1.18		1.06		0.94		0.84		0.72		0.64		0.56	
Available Phosphorous		0.60		0.53		0.47		0.42		0.36		0.32		0.28	
NPP*		0.58		0.52		0.47		0.42		0.37		0.32		0.28	
Sodium**		0.14		0.13		0.12		0.11		0.11		0.10		0.10	
Chloride**		0.16		0.15		0.14		0.14		0.13		0.13		0.13	

* None Phytate Phosphorus. Further information on phosphorus is available in Aviagen technical publication REVISED PHOSPHORUS AND CALCIUM GUIDELINES FOR TURKEYS 2011

** Electrolyte levels are shown as an indication but should be adjusted to local conditions to control moisture content of the bedding.

Feed Calculator

The Aviagen feed calculator is provided in an excel spread sheet on the Aviagen Turkeys website. This tool allows users to enter their current or planned feeding programme and the energy level of the diets that will be used. Up to 10 feeding periods can be accommodated. The spread sheet then uses a regression to calculate the lysine level, based on the age of the turkeys at the middle of each feeding period. Then the other amino acids are calculated by reference to an Ideal Protein Model – see below, this expresses the level of each amino acid in a relationship to the lysine level.

This spread sheet allows users to evaluate different feeding scenarios, based on Aviagen's core nutritional guidelines. There are options to look at Total and Digestible amino acid guidelines for males. A separate sheet provides guidelines on feeding females. There are also sections where the users can enter their current feeding programme and see their nutrient values in comparison with the Aviagen guidelines in a graphical format.

Ideal Protein Model

Age-Days Males	Age-Days Females	Lysine	Meth	M+C	Thr	Trp	Arg	Val	Ileu
1-21	1-21	100%	36%	65%	58%	14%	102%	67%	61%
22-42	22-42	100%	36%	66%	59%	16%	103%	68%	61%
43-63	43-56	100%	37%	67%	60%	16%	103%	69%	62%
64-84	57-70	100%	38%	68%	61%	16%	103%	70%	62%
85-105	71-84	100%	38%	70%	62%	18%	103%	71%	63%
106-126	85-98	100%	41%	74%	62%	19%	104%	72%	64%
127-147	99-126	100%	43%	78%	63%	20%	105%	74%	65%

TABLE 2A: EXAMPLE OF A LOW ENERGY DENSITY FEEDING PROGRAMME FOR AVIAGEN HEAVY LINES (7 PHASES)

RATION NUMBER		1		2		3		4		5		6		7	
MALES	DAYS	0-21		22-42		43-63		64-84		85-105		106-126		127-147	
FEMALES	DAYS	0-21		22-42		43-56		57-70		71-84		85-98		99-126	
Protein	%	26-28		24-26		23-25		20-22		18-20		15-18		14-17	
Energy	Cals/Lb	1268		1290		1312		1333		1366		1399		1431	
	Kcals/kg	2790		2838		2886		2933		3005		3076		3148	
	Mj/Kg	11.7		11.9		12.1		12.3		12.6		12.9		13.2	
AMINO ACIDS		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
Lysine	%	1.73	1.65	1.53	1.44	1.35	1.25	1.19	1.09	1.04	0.96	0.93	0.85	0.81	0.74
Methionine	%	0.62	0.59	0.55	0.52	0.50	0.46	0.45	0.41	0.40	0.37	0.38	0.34	0.35	0.32
Methionine + Cystine	%	1.12	1.07	1.01	0.95	0.90	0.84	0.81	0.75	0.73	0.67	0.69	0.62	0.63	0.58
Tryptophan	%	0.25	0.24	0.24	0.23	0.22	0.20	0.19	0.18	0.19	0.17	0.18	0.16	0.18	0.15
Threonine	%	1.01	0.96	0.90	0.85	0.81	0.75	0.72	0.66	0.65	0.59	0.57	0.52	0.52	0.47
Arginine	%	1.77	1.68	1.57	1.48	1.39	1.29	1.23	1.13	1.07	0.99	0.97	0.88	0.85	0.78
Valine	%	1.16	1.10	1.04	0.98	0.93	0.86	0.83	0.77	0.74	0.68	0.66	0.60	0.60	0.55
iso-Leucine	%	1.06	1.00	0.93	0.88	0.84	0.78	0.74	0.68	0.66	0.61	0.59	0.54	0.53	0.48
MINERALS															
Calcium	%	1.38		1.26		1.14		1.03		0.91		0.83		0.74	
Available Phosphorous	%	0.70		0.63		0.57		0.52		0.45		0.41		0.37	
NPP*	%	0.67		0.62		0.57		0.52		0.46		0.41		0.37	
Sodium	%	0.16		0.15		0.15		0.14		0.14		0.13		0.13	
Chloride	%	0.19		0.18		0.17		0.17		0.16		0.17		0.17	
Linoleic Acid (18:2)	%	1.25		1.20											

* None Phytate Phosphorous

TABLE 2B: EXAMPLE OF A MEDIUM ENERGY DENSITY FEEDING PROGRAMME FOR AVIAGEN HEAVY LINES (7 PHASES)

RATION NUMBER		1		2		3		4		5		6		7	
MALES	DAYS	0-21		22-42		43-63		64-84		85-105		106-126		127-147	
FEMALES	DAYS	0-21		22-42		43-56		57-70		71-84		85-98		99-126	
Protein	%	26-28		24-26		23-25		20-22		18-20		15-18		14-17	
Energy	Cals/Lb	1290		1323		1366		1399		1431		1464		1496	
	Kcals/kg	2838		2909		3005		3076		3148		3219		3291	
	Mj/Kg	11.9		12.2		12.6		12.9		13.2		13.5		13.8	
AMINO ACIDS		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
Lysine	%	1.76	1.67	1.57	1.48	1.41	1.30	1.25	1.14	1.09	1.01	0.97	0.89	0.85	0.77
Methionine	%	0.63	0.60	0.56	0.53	0.52	0.48	0.47	0.43	0.42	0.39	0.40	0.36	0.37	0.33
Methionine + Cystine	%	1.14	1.09	1.04	0.97	0.94	0.87	0.85	0.79	0.76	0.70	0.72	0.65	0.66	0.61
Tryptophan	%	0.25	0.24	0.25	0.24	0.23	0.21	0.20	0.19	0.20	0.18	0.19	0.17	0.19	0.16
Threonine	%	1.02	0.97	0.92	0.87	0.84	0.78	0.76	0.69	0.68	0.62	0.60	0.55	0.54	0.49
Arginine	%	1.80	1.71	1.61	1.52	1.45	1.34	1.29	1.19	1.12	1.04	1.01	0.92	0.89	0.82
Valine	%	1.18	1.12	1.07	1.00	0.97	0.90	0.87	0.81	0.78	0.71	0.70	0.63	0.63	0.57
iso-Leucine	%	1.08	1.02	0.95	0.90	0.87	0.81	0.78	0.71	0.69	0.64	0.62	0.57	0.55	0.50
MINERALS															
Calcium	%	1.40		1.29		1.19		1.08		0.95		0.86		0.77	
Available Phosphorous	%	0.71		0.65		0.59		0.55		0.47		0.43		0.39	
NPP*	%	0.69		0.64		0.59		0.55		0.48		0.43		0.39	
Sodium	%	0.16		0.15		0.16		0.15		0.15		0.14		0.14	
Chloride	%	0.19		0.18		0.18		0.18		0.17		0.18		0.18	
Linoleic Acid (18:2)	%	1.25		1.20											

* None Phytate Phosphorous

TABLE 2C: EXAMPLE OF A HIGH ENERGY DENSITY FEEDING PROGRAMME FOR AVIAGEN HEAVY LINES (7 PHASES)

RATION NUMBER		1		2		3		4		5		6		7	
MALES	DAYS	0-21		22-42		43-63		64-84		85-105		106-126		127-147	
FEMALES	DAYS	0-21		22-42		43-56		57-70		71-84		85-98		99-126	
Protein	%	26-28		24-26		23-25		20-22		18-20		15-18		14-17	
Energy	Cals/Lb	1333		1388		1431		1464		1496		1529		1561	
	Kcals/kg	2933		3053		3148		3219		3291		3363		3434	
	Mj/Kg	12.3		12.8		13.2		13.5		13.8		14.1		14.4	
AMINO ACIDS		Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible	Total	Digestible
Lysine	%	1.82	1.73	1.65	1.55	1.47	1.36	1.31	1.20	1.14	1.05	1.01	0.93	0.88	0.81
Methionine	%	0.65	0.62	0.59	0.56	0.55	0.50	0.49	0.45	0.44	0.41	0.42	0.37	0.38	0.35
Methionine + Cystine	%	1.18	1.12	1.09	1.02	0.98	0.92	0.89	0.82	0.80	0.73	0.75	0.68	0.69	0.63
Tryptophan	%	0.26	0.25	0.26	0.25	0.24	0.22	0.21	0.20	0.21	0.19	0.20	0.18	0.20	0.16
Threonine	%	1.06	1.00	0.97	0.91	0.88	0.82	0.79	0.72	0.71	0.65	0.63	0.57	0.57	0.51
Arginine	%	1.86	1.76	1.69	1.59	1.52	1.41	1.35	1.24	1.17	1.08	1.06	0.96	0.93	0.85
Valine	%	1.22	1.16	1.12	1.05	1.01	0.94	0.91	0.85	0.81	0.74	0.73	0.66	0.65	0.60
iso-Leucine	%	1.11	1.06	1.00	0.95	0.91	0.85	0.81	0.75	0.72	0.67	0.65	0.59	0.58	0.52
MINERALS															
Calcium	%	1.45		1.36		1.24		1.13		1.00		0.90		0.81	
Available Phosphorous	%	0.74		0.68		0.62		0.57		0.49		0.45		0.40	
NPP*	%	0.71		0.67		0.62		0.57		0.50		0.45		0.40	
Sodium	%	0.17		0.16		0.16		0.15		0.15		0.14		0.14	
Chloride	%	0.20		0.19		0.19		0.19		0.18		0.19		0.19	
Linoleic Acid (18:2)	%	1.25		1.20											

* None Phytate Phosphorous

TABLE 3: VITAMIN AND TRACE MINERAL ADDITIONS

ADDED VITAMINS PER KG		0-3 weeks		4-6 weeks		7-12 weeks		13-16 weeks		17 + weeks	
		Wheat Based	Maize Based	Wheat Based	Maize Based	Wheat Based	Maize Based	Wheat Based	Maize Based	Wheat Based	Maize Based
Vitamin A	iu	12000	11000	10000	8000	8000	7000	7000	6000	6000	5000
Vitamin D3	iu	4000	4000	3500	3500	3000	3000	3000	3000	2500	2500
Vitamin E	iu	100	100	50	50	30	30	25	25	20	20
Vitamin K	mg	4	4	2	2	2	2	2	2	2	2
Thiamin (B1)	mg	4	4	2	2	2	2	1.5	1.5	1.5	1.5
Riboflavin (B2)	mg	10	10	5	5	5	5	4	4	4	4
Nicotinic Acid	mg	75	80	60	65	50	55	40	45	40	45
Pantothenic Acid	mg	25	28	15	16	15	16	12	12	12	12
Pyridoxine (B6)	mg	7	6	5	4	4	3	3	2	2	1.5
Biotin	mg	0.30	0.20	0.30	0.20	0.20	0.15	0.15	0.10	0.10	0.10
Folic Acid	mg	4	4	2	2	1	1	1	1	1	1
Vitamin B12	mg	0.030	0.030	0.020	0.020	0.015	0.015	0.015	0.015	0.010	0.010
Choline	mg	1600	1600	1200	1200	600	600	400	400	300	300

ADDED TRACE MINERALS PER KG						
Copper	mg	12	12	12	12	10
Iron	mg	100	80	60	45	45
Manganese	mg	130	120	110	110	110
Molybdenum	mg	0.5	-	-	-	-
Selenium	mg	0.4	0.3	0.3	0.25	0.2
Zinc	mg	100	100	100	80	80
Iodine	mg	3	2	2	1	1

Levels of some vitamins and minerals, that can be added to the feed, may be controlled by local regulations and these should be observed. Vitamin stability can be affected by heat processing of the feed and an allowance may need to be made to offset any losses.

TABLE 4: INGREDIENT CONSTRAINTS

Age of Turkeys	0-6 Weeks		7-12 Weeks		13-15 Weeks		15-21 Weeks	
	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %
Cereals:								
Maize	0	100	0	100	0	100	0	100
Wheat [1]	20	100	20	100	20	100	20	100
Barley [1]	0	10	0	15	0	20	0	25
Triticale	0	10	0	10	0	10	0	10
Sorghum [2]	0	10	0	20	0	20	0	20
Vegetable Proteins:								
Soya 48-50%	0	50	0	40	0	35	0	30
Full Fat Soya	0	10	0	10	0	10	0	10
Combined Constraint Total Soya Products	0	40	0	40	0	15	0	15
Extracted Rapeseed	0	2	0	3	0	5	0	7.5
Whole Rapeseed	0	2	0	3	0	5	0	10
Combined Constraint Total Rape Products	0	3	0	5	0	7.5	0	10
Extracted Sunflower 33-38% protein	0	5	0	5	0	5	0	7.5
Extracted Sunflower 27-30% protein	0	0	0	3	0	5	0	5
Combined Constraint Total Sunflower Products	0	5	0	5	0	5	0	7.5
Peas	0	5	0	5	0	7	0	10
Field Beans	0	2.5	0	3	0	5	0	5
Combined Constraint Total Pulses	0	5	0	5	0	7	0	10

[1] Assumes use of NSP enzyme.
[2] Low tannin varieties

Age of Turkeys	0-6 Weeks		7-12 Weeks		13-15 Weeks		15-21 Weeks	
	Min %	Max %	Min %	Max %	Min %	Max %	Min %	Max %
Animal Proteins [3]								
Fish Meal	2.5[4]	7	0	5	0	5	0	5
Meat + Bone Meal	0	3	0	5	0	8	0	10
Poultry Meal	0	5	0	5	0	5	0	5
Cereal By-products								
Wheat Bran	0	5	0	0	0	0	0	0
Maize Gluten Meal	0	5	0	5	0	5	0	5
Middlings	0	20	0	15	0	15	0	15
Distillers Dark Grains + Solubles	0	2	0	3	0	5	0	8
Added Fats and Oils:								
Soybean or Sunflower Oil	1	5	2	5	0	5	0	10
Palm Oil	0	0	0	1	0	2	0	5
Rape Oil	0	0	0	1	0	2	0	5
Fat Blend- veg oils, low FFA, C18. 2>25%	0	2	0	3	0	5	0	10
Fat Blend-general purpose, FFA > 10%, C18. 2>20%	0	0	0	1	0	3	0	5
Tallow and Lard	0	2	0	3	0	5	0	10
Animal/Veg blend, FFA < 15%, C18.2 > 15%	0	0	0	1	0	3	0	5
Poultry Fat	0	2	0	3	0	5	0	10

[3] The use of fish meal and other animal proteins may be controlled by local regulations. These should be checked before use.
[4] Minimum in starter diets to reduce soya levels if no other animal protein.

Aviagen™ Turkeys

Every attempt has been made to ensure the accuracy and relevance of the information presented. However, Aviagen Turkeys accepts no liability for the consequences of using the information for the management of turkeys.

For further information, please contact your local Aviagen Turkeys Manager.

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