

ZZT424

Kanatlı Hayvan Besleme

Broyles Besleme

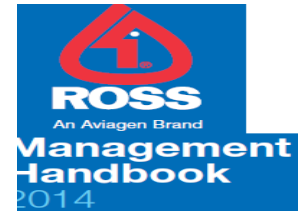
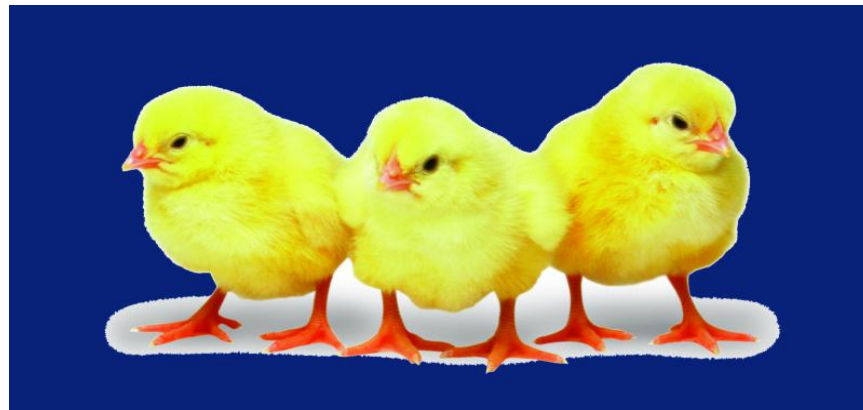
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ZZT424-Kanatlı Hayvan Besleme Ders Notları

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Broyler Besleme



Etlik Piliçlerde Protein ve Amino Asitler

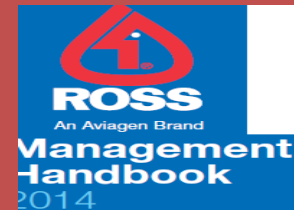
- Feed proteins are complex amino acid polymers which are broken down in the gut into amino acids. These amino acids are absorbed and assembled into body proteins which are used in the construction of body tissue e.g. muscles, nerves, skin and feathers.
- Dietary *crude protein* levels do not indicate the quality of the proteins in a feed, protein quality is based on the presence and balance of essential amino acids in the feed ingredients.

Etlik Piliçlerde Protein ve Amino Asitler

- The availability to the bird of these essential amino acids is most important and broiler feeds should be formulated using digestible amino acids. It should be noted that the digestible amino acid levels quoted in here are based on true faecal digestibility,
- **When the apparent digestibility system is used, the recommendation should be adjusted accordingly.**

Etlik Piliçlerde Protein ve Amino Asitler

- The levels of crude protein suggested in here should be seen as a guide, the actual protein level used will vary according to the feed ingredients and will be driven by the first limiting essential amino acid not available in synthetic form.



- It is preferable to use high quality protein sources where these are available, especially for broilers under heat stress. Poor quality or imbalanced protein can create metabolic stress as there is an energy cost associated with its excretion and may also result in wet litter.

Etlik Piliçlerde Protein ve Amino Asitler -Formülasyon Stratejileri-

- Amino acid levels in feeds must be considered together with all other nutrients, including energy levels
- Recommended levels for those eight amino acids that may be limiting in practical feeds
- Feed formulation aims to supply an adequate and balanced level of amino acids to the bird.
- To achieve this, it is important that the formulation matrix is routinely updated. Protein levels of ingredients should be monitored by direct analysis of the raw materials being used in the formulations.
- If changes are seen in protein level of an ingredient, then adjustments should be made to total and digestible acid values in the formulation matrix.

-Formülasyon Stratejileri- İdeal Amino Asit Profili

- It is important to supply the broiler with an appropriate balance of digestible amino acids.
- As an aid to achieving this objective, an Ideal Amino Acid Profile can be used.
- This is a system where the requirement of the main amino acids that may be limiting in broiler feeds are calculated and then lysine is used as the reference amino acid to which ratios are set for other amino acids.

Amino Asitler ve Enerji Değerleri

Table 2. The gross energy content of amino acids¹

Amino acid	Gross energy (kcal/kg)
Aspartic acid	2,892
Threonine	4,111
Serine	3,298
Glutamic acid	3,657
Proline	5,664
Glycine	3,083
Alanine	4,350
Valine	5,975
Isoleucine	6,597
Leucine	6,597
Tyrosine	5,951
Phenylalanine	6,740
Histidine	5,186
Lysine	5,617
Arginine	5,115
Methionine	4,446
Cystine	4,398

¹Data from Boisen and Verstegen (2000).

-Formülasyon Stratejileri- İdeal Amino Asit Profili

Digestible Amino Acid	Starter Feed	Grower Feed	Finisher Feed
Lysine	100	100	100
Methionine & Cystine	74	76	78
Methionine	37	38	39
Threonine	65	66	67
Valine	75	76	77
iso-Leucine	67	68	69
Arginine	103	104	105
Tryptophan	16	16	16

Yumurta Tavuklarında İdeal Amino Asit Profili

Table 2. Ideal amino acid profiles of single-comb white leghorn laying hens.¹

Amino acid	NRC (1994) ²	CVB (1996) ³	Coon and Zhang (1999) ³	Leeson and Summers (2005) ⁴	Bregendahl <i>et al.</i> (2008) ⁵
Lysine	100	100	100	100	100
Arginine	101	–	130	103	– ⁶
Isoleucine	94	79	86	79	79
Methionine	43	50	49	51	47
Methionine+cystine	84	93	81	88	94
Threonine	68	66	73	80	77
Tryptophan	23	19	20	21	22
Valine	101	86	102	89	93

¹Amino acid requirements expressed as a percentage of the requirement for lysine.

²Calculated from total amino acid requirements.

³Based on digestible amino acid requirements.

⁴Calculated from total amino acid recommendations for 32-to-45-week-old laying hens.

⁵Based on true digestible amino acid requirements for egg mass in 28-to-34-week-old laying hens.

⁶The arginine:lysine ratio was estimated to be 107 or less (see text).

Etlik Piliçlerin Protein ve Amino Asite Tepkileri

- Ross broiler is particularly responsive to dietary digestible amino acid levels and will respond very efficiently, in terms of growth and FCR, to the recommended levels in the Ross Broiler Nutrition Specification.
- Higher levels of digestible amino acids have been shown to improve profitability by increasing broiler performance and processing yield. This becomes particularly important when growing broilers for portioning or meat stripping.

Etlik Piliçlerin Makro Mineral İhtiyaçları

- Ca, P, K, Mg, Na ve Cl
- Calcium in the diet of broilers 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 to achieve optimum performance.
- These responses may require different calcium levels to allow optimum expression, so a compromise must be made when choosing a level of dietary calcium.

Etlik Piliçlerin Makro Mineral İhtiyaçları

- Phosphorus, like calcium, is required in the correct form and quantity to optimise skeletal structure and growth. Phosphorus recommendations in this Supplement are based on the classical availability system whereby inorganic phosphorus sources are described as being 100% available and plant sources are described as 33% available. Values of available phosphorus based on toe ash analysis have been found to show correlation with the classical system.
- Digestible phosphorous is used in some countries as a way of more accurately assessing the phosphorus contribution of materials. Care should be taken to use consistent data on available phosphorus content of feed ingredients and bird requirements.

Calcium: Available Phosphorus. In most instances a Ca:AvP ratio of 2:1 is appropriate for broiler diets. However, there is information available which suggests that in Starter diets a higher Ca:AvP (e.g. 2.1:1) is beneficial to performance and especially helpful promoting excellent leg strength.

Bitkisel Yemler, P İçerikleri ve Sindirilebilirlik

Yem Hammaddesi	Toplam P (g kg ⁻¹)	Fitat-P (g kg ⁻¹)	Oran (%)
Tahıllar			
Arpa	3.21 (2.73–3.70)a	1.96 (1.86–2.20)a	61.0 (59–68)
Mısır	2.62 (2.30–2.90)	1.88 (1.70–2.20)	71.6 (66–85)
Sorgum	3.01 (2.60–3.09)	2.18 (1.70–2.46)	72.6 (65–83)
Buğday	3.07 (2.90–4.09)	2.19 (1.80–2.89)	71.6 (55–79)
Yağlı Tohum Küspeleri			
Kanola Küspesi	9.72 (8.79–11.50)	6.45 (4.00–7.78)	66.4 (36–76)
Pamuk Toh. Küspesi	10.02 (6.40–11.36)	7.72(4.9–9.11)	77.1 (70–80)
Soya Tohumu Küspesi	6.49 (5.70–6.94)	3.88 (3.54–4.53)	59.9 (53–68)
Yan Ürünler			
Pirinç Kepeği	17.82 (13.40–27.19)	14.17 (7.90–24.20)	79.5 (42–90)
Buğday Kepeği	10.96 (8.02–13.71)	8.36 (7.00–9.60)	76.3 (50–87)

Table 1. Calcium and Phosphorus Content of Common Plant Feedstuffs¹

Feedstuffs	Calcium Content	Total Phosphorus Content	Nonphytate Phosphorus Content	Nonphytate Phosphorus Content (% of Total Phosphorus)
	%	%	%	(% of Total Phosphorus)
Alfalfa Meal, 17% CP	1.44	0.22	0.22	100.0
Barley	0.03	0.36	0.17	47.2
Buckwheat	0.09	0.32	0.12	37.5
Canola Meal, 38% CP	0.68	1.17	0.30	25.6
Corn Gluten Meal, 60% CP	--	0.50	0.14	28.0
Corn, Grain	0.02	0.28	0.08	28.5
Cottonseed Meal, 41% CP	0.15	0.97	0.22	22.6
Distillers Dried Grains	0.10	0.40	0.39	97.5
Distillers Dried Solubles	0.35	1.27	1.17	92.1
Oats, Grain	0.06	0.27	0.05	18.5
Peanut Meal	0.20	0.63	0.13	20.6
Pearl Miller	0.05	0.32	0.12	37.5
Rice Bran	0.07	1.50	0.22	14.7

Yem	P içeriği, %	Sindirilebilirlik, %	Değişim
		Ortalama	
Mısır	0.23	17	12-26
Buğday	0.41	47	45-51
Razmol	1.20	28	18-35
Mısır Gluteni	0.98	20	12-32
Soya Küspesi	0.73	38	33-41

Kanatlılarda Diğer P Kaynakları ve Yararlanılabilirlikleri

Biyoyararlanım

100

?

P Kaynağı	P içeriği, %	Yararlanıla. P Oranı,%
Kemik Unu	7.6	59
Balık Unu	2.2	74
Et Unu	2.9	65
Et Kemik Unu	6	66
Ca sodyum PO4	18	59
DCP (susuz)	19.7	55
DCP(sulu)	18.1	77
MCP	22.6	84
MCP	21.3	79
	22.4	92

(Van der Klis & Versteegh, 1996)

	Ca	P	Biyoyarayışlılık, %
MCP	16.31	20.60	92.6
DCP	21.24	18.31	81.2
Deflorine Fosfat	30.92	18.2	69.6

P, Ca ve Vitamin D ilişkisi

- Eksiklikleri, fazlalıkları ve birbirine oranları tavukların büyümesi, gelişmesi, iskelet bütünlüğü, iştah ve ürün kalitesi için son derece önemli. Uygun oran 2:1
- Ca, Alüminyum ve Mg fazlalığı P emilimini bozar.
- Mikotoksinler vit D absorpsiyonunu bozar
- Fazla yağ mineral emilimi bozar
- **Ca fazlalığında incebağırsakta çözünmez Kalsiyum fosfat bileşiği - P yetmezliği**
- Ca eksik olursa da bu sefer emilen P böbreklerden atılımı artar.
- Yetmezlik P kaynaklarının kötü sindirimi ve eksik formülasyon

Fosfor, Kalsiyum, Vitamin D3 ve Kemik Problemleri

Vitamin D and its derivatives may also increase P absorption simply by increasing Ca absorption. Less Ca increases the proportion of soluble P in contact with the gut mucosa as Ca forms the Ca_2PO_4 salt at the normal intestinal pH (Hurwitz and Bar, 1971). Phosphates in this insoluble state are unavailable for absorption.

Rickets

Tibial dyschondroplasia

cartilage (Jubb and Kennedy, 1970). It is generally considered to be the result of an imbalance of vitamin D_3 , calcium, and phosphorus or a deficiency of one of these nutrients.

plate. A P deficiency results in an enlarged growth plate because hypertrophic cells are not removed as rapidly as they are produced^[2,3]. A severe Ca deficiency results in an enlarged growth plate because proliferative cells fail to mature to hypertrophic cells for removal^[4].

Maintaining Ca while increasing NPP also increases incidence of TD^[10]. Increasing other anions, such as chloride and sulfate on a milliequivalent basis equal to that of phosphate, also increased TD. Varying dietary vitamin D concentrations alters the incidence and severity of TD^[7,9,11,12].

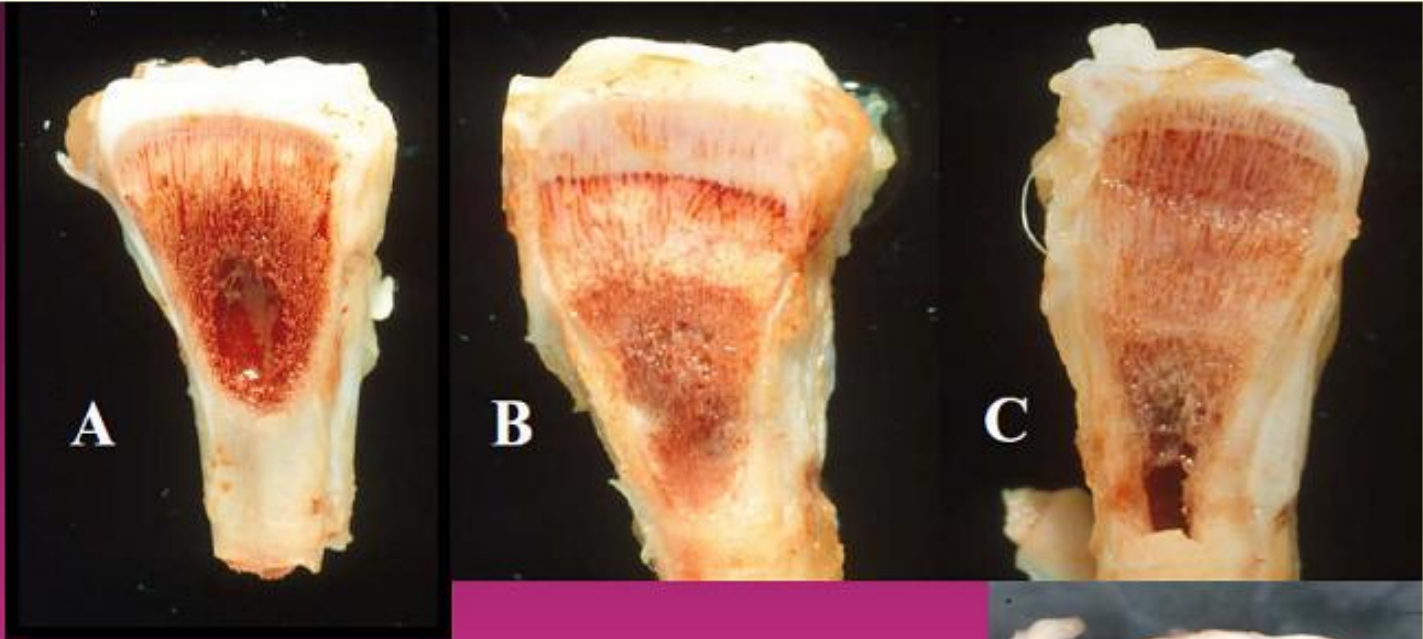
Leach and Nesheim (1965). Edwards (1984) stated that TD usually appears between 3 and 8 wk of age and is caused by a low level of dietary calcium and a high level of dietary phosphorus (Edwards, 1983). The bone lesion is character-

Vitamin D and several of its carbon-1, α hydrox derivatives have been shown to improve PP and t (tP) uptake in chicks. The mechanisms by which this

Fosfor, Kalsiyum, Vitamin D3 ve Kemik Problemleri

Rickets





A Normal

B Ca/D deficiency rickets

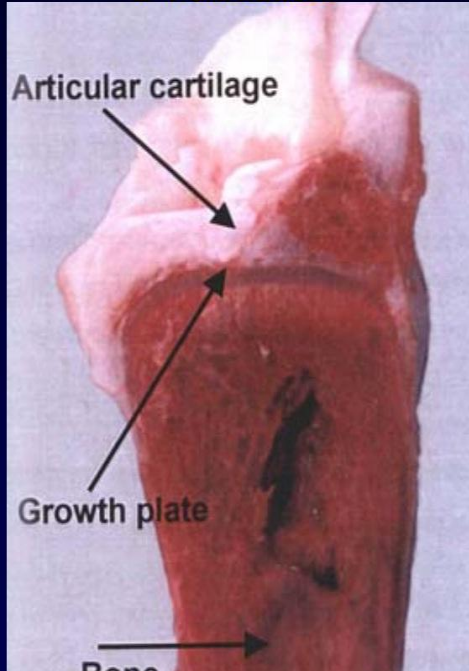
C P deficiency rickets

D Tibial dyschondroplasia

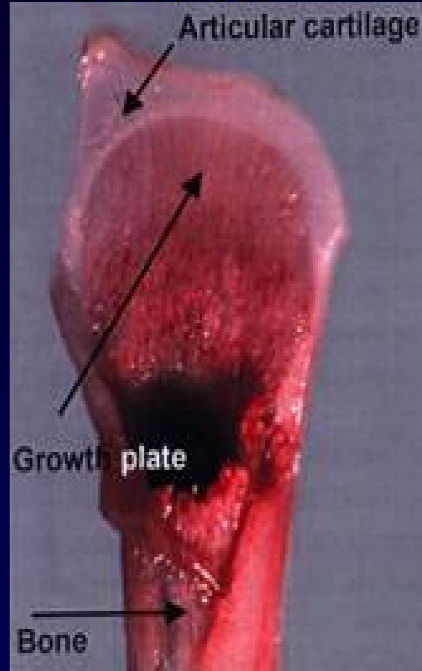


Fosfor, Kalsiyum, Vitamin D3 ve Kemik Problemleri

Normal



Rickets



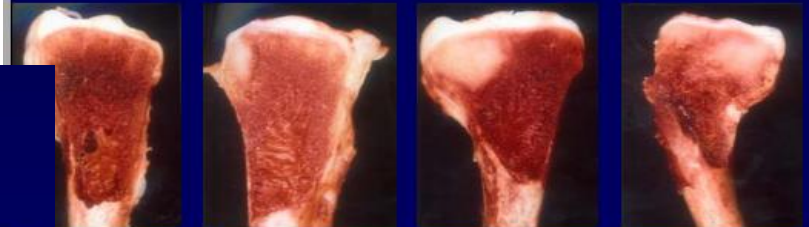
Unmineralized

N

TD



Scoring system



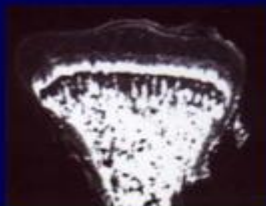
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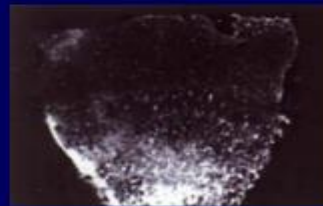
TD and rickets are different diseases of the growth plate



N



TD



Rickets

Etlik Piliçlerin Makro Mineral İhtiyaçları

- Mg,
- Magnesium requirements are normally met without the need for supplementation. Excessive magnesium (>0.5%) will cause scouring.
- Sodium, potassium and chloride are needed for a number of metabolic functions.
- Excessive levels of these minerals results in increased water intake and subsequent poor litter quality. Shortages can affect feed intake, growth and blood pH.

Etlik Piliçlerin Makro Mineral İhtiyaçları

- In particular, chloride should be accurately controlled by the use of sodium chloride and sodium bicarbonate. In feed formulation all dietary sources of chloride should be carefully identified e.g. in lysine hydrochloride and choline chloride.
- There are some circumstances when higher levels of sodium can be used to improve growth rates, notably in pre-starter products.
- **Electrolyte balance (EB) is important to broilers, especially in heat stress conditions.**
- The anion content of both vitamin and mineral premixes should always be included in the calculation of ionic balance in finished feeds. With practical potassium levels of about 0.85% and the recommended levels of sodium and chloride, an EB (sodium + potassium - chloride) of about 220-230 mEq/kg obtained.

Etlik Piliçlerin İz Mineral İhtiyaçları

- Trace minerals and vitamins are needed for all metabolic functions. Appropriate vitamin and trace mineral supplementation depends on feed ingredients, feed manufacture and local circumstances. Conventional levels of supplementation are recommended for these nutrients. Care should be taken to ensure that suitable forms of each mineral are included in the premix. Organic trace elements have a higher availability in general. There is evidence that enhancement of the zinc and selenium status of broilers may improve feathering and the immune response of the birds. Zinc has been shown to improve foot health.

Etlik Piliçlerin Vitamin İhtiyaçları

- Appropriate vitamin supplementation depends on feed ingredients, feed manufacture and local circumstances. A major source of variation in supplementation for some vitamins is cereal type. **Separate recommendations have been made for vitamin A, nicotinic acid, pantothenic acid, pyridoxine (B6) and biotin in maize and wheat-based feed.**
- It should be noted that the recommendation for **choline** is given as a minimum specification in the complete feed.

Etlik Piliçlerin Vitamin İhtiyaçları

- Many circumstances, e.g. stress, disease incidence, may make birds responsive to vitamin levels higher than those recommended. Increases in the levels of vitamins supplied, in the feed or via the water, must be based on local knowledge and experience.
- In general, the longer-term strategy should be to remove or reduce any stress factors, rather than to depend on permanent use of excessive vitamin supplementation.
- The basic requirement of broiler chickens for vitamin E is 10-15 mg/kg. The need for extra
- supplementation will depend on the level and type of fat in the diet, on the level
- of selenium and on the presence of pro- and anti-oxidants.
- **Heat treatment of feeds can result in the destruction of up to 20% of vitamin E.**
- Enhancement of immune response and improvements in shelf-life of broiler meat are observed at vitamin E levels up to 300 mg/kg.
- The levels suggested in the Appendices are suitable for production of healthy broilers under normal conditions but there may be situations, e.g. disease outbreaks, in which higher levels of vitamin E are justified.

Besinsel Olmayan Katkılar-Yem Katkı Maddeleri

Medicinal and Prophylactic Drugs: A wide range of medicinal products, e.g. coccidiostats and antibiotics, may be administered through the feed. Veterinary control and authorisation in accordance with local regulations is essential.

Antibiotic Growth Promoters/Digestion Enhancers: These products are still being used in some parts of the world. The mode of action involves modification of the gut microflora, with consequential benefits in nutrient utilisation.

Prebiotics: Prebiotics are a group of substances which stimulate the growth of beneficial, at the expense of harmful, micro-organisms. Oligosaccharides form the largest group of these products at present.

Probiotics: Probiotics introduce live micro-organisms into the digestive tract to assist the establishment of a stable and beneficial microflora. The objective is to provide the gut with positive, non-pathogenic micro-organisms which will then prevent colonisation with pathogenic micro-organisms by competitive exclusion.

Besinsel Olmayan Katkılar-Yem Katkı Maddeleri

Organic Acids: Organic acid products can be used to reduce bacterial contamination of the feed (e.g. after heat treatment) and can also encourage beneficial microflora to develop in the digestive tract of the bird.

Absorbents: Absorbents are used specifically to absorb mycotoxins. They may also have a beneficial effect on general bird health and nutrient absorption. There are a range of products available for use as absorbents, including various clays and charcoal.

Antioxidants: Antioxidants can provide important protection against nutrient loss in broiler feeds. Some feed ingredients e.g. fish meal and fats, can be protected. Vitamin premixes should be protected by an antioxidant unless optimum storage times and conditions are provided. Additional antioxidants may be added to the final feed where prolonged storage or inadequate storage conditions are unavoidable.

Anti-Mould Agents: Mould inhibitors may be added to feed ingredients, which have become contaminated, or to finished rations to reduce growth of fungi and production of mycotoxins.

Pelleting Agents: Pelleting agents are used to improve pellet hardness. Some examples of pellet binders are hemicellulose, bentonite and guar gum.

Other products of possible use in broiler production include essential oils, nucleotides, glucans and specialised plant extracts. In areas of the world where its use is permitted formaldehyde can be used to treat/preserve feed.

Dönemlere Göre Yem Özellikleri

Broiler Starter Feeds

The objective of the 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 described in the *Appendices*, will allow the bird to achieve maximum early growth. This is important in all modern broiler systems and is of particular importance in the production of small birds, in challenging conditions or when breast meat production is at a premium.

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.

Dönemlere Göre Yem Özellikleri

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 maximise performance. If any growth restriction is required it should be applied during this period. Use of management techniques, e.g. meal feeding or lighting to restrict feed intake, is preferred. Growth restriction by diet composition is not recommended.

Dönemlere Göre Yem Özellikleri

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.

The decision whether to use one or two Broiler Finisher feeds will depend on desired slaughter weight, the length of the production period and the design of the feeding programme. Withdrawal periods for drugs may dictate the use of a special withdrawal finisher feed. This feed should be adjusted for the age of the birds but the practice of extreme nutrient withdrawal during this period is not recommended.

Use of Starter, Grower and Finisher feeds as described above form the classic phase feeding regime. As an alternative to this classic system, specialised pre-starter products can be used in the early stages of production.

Dönemlere Göre Yem Özellikleri

Prestarter

Pre-Starter Products

The anatomy and physiology of young chicks differs significantly from that of older broilers. Post-hatch the transformation from embryonic absorption of yolk to utilisation of feed is accompanied by dramatic changes in the digestive tract. In the first few days after hatching, the pancreas and intestine increase in size almost four times quicker than the body as a whole. The digestive system of the young chick is immature, therefore care must be taken to ensure that the nutrient levels are optimal and the raw materials used are highly digestible.

Use of special 'Pre-Starter' products, some of which contain more digestible raw materials, have been shown to be effective in promoting early development of broilers and improving subsequent processing performance. Such products are often of superior physical quality and provide a feed intake response (see section on *Feed Processing and Feed Form*, page 15).

Broiler chicks have significant potential for development at this age and the response to increased nutrient levels in this period is well established. Feeding a Pre-Starter product to supply levels of amino acids above the Ross recommendations will provide an additional growth response.

Although the use of Pre-Starter products involves increased feed cost, they are only used for the first few days of life when feed intake is relatively low and therefore have only a small impact on overall cost of production. Generally, there is a positive response in margin achieved as a result of improved overall broiler performance and increased revenue.

Some features of Pre-Starter products are listed below:

- Use of highly digestible ingredients.
- High nutrient levels, especially amino acids, vitamin E and zinc.
- Use of pre- and pro-biotics.
- Immunity stimulants; essential oils, nucleotides etc.
- Intake stimulants; feed form, high sodium, flavours etc.

Vitamin Mineral Premiksler

Vitamin and Mineral Premixes

A general recommendation is given in the *Appendices*, for supplementation of feeds with vitamins and trace minerals. Occasionally, circumstances may arise which cause an increase in vitamin requirements. In these situations, the strategic use of water-soluble vitamin products should be considered as a possible supplementation to the vitamins already included in the feed.

Aviagen does not endorse the practice of removing vitamin premix during the final stages of the birds' growth because of welfare considerations.

Practical vitamin supplementation should take into account losses in activity which might occur between premix manufacture and feeding. Selection and source of vitamin products, premixing, storage times and conditions at all stages, and feed processing are the most important factors in vitamin losses. The exclusion of choline chloride from premix is strongly recommended to reduce oxidative losses. Storage conditions should be cool, dry and dark to reduce the risk of oxidation and careful stock control should be exercised. The incorporation of an antioxidant in premixes is recommended.

Key Points

- Ensure appropriate storage times and cool, dark storage conditions between manufacture of premixes and inclusion into the feed. Supplement levels should take account of probable losses during feed processing and storage.

Fat Sources

Fat, of either animal or vegetable origin, may be added to rations. Animal fats, other than poultry fat, contain more saturated fatty acids, which are less digestible, especially in the immature digestive system of the chick. In Starter and Grower rations, it is advisable to use fats containing higher percentages of unsaturated fats. However, in Finisher rations the potential for high levels of unsaturated fats to have a detrimental effect on carcass greasiness and storage quality should be considered. Combined moisture and impurities levels should be less than 1%. The presence of a significant amount of water promotes rancidity. Solid material residues from the rendering, extraction or fat recovery process can block filters and nozzles.

It is important that the quality of fat ingredients is carefully controlled, see the table below.

Criteria Required for Feed Fats	
Moisture and impurities	max 1%
Monomeric fatty acids	min 92%
Non-elutable material	max 8%
Free fatty acids	max 50%
Oxidised fatty acids	max 2%
Antioxidant	Present

Key Point

- Supply unsaturated fats in starter and grower rations.