

BROILER

ROSS

Nutrition Specifications

2022



Introduction

This document contains the nutritional recommendations for Ross® broilers and is intended to be used in conjunction with the *Ross Broiler Management Handbook*.

Nutrition specifications for broilers are given in the following tables for a range of production and market situations across the world:

As-hatched	≤ 2.0 kg (≤ 4.4 lb) Target Live Weight	Table 1
As-hatched	2.0 - 3.5 kg (4.4 - 7.7 lb) Target Live Weight	Table 2
As-hatched	> 3.5 kg (> 7.7 lb) Target Live Weight	Table 3

The nutrient specifications included in this document aim to support the achievement of optimal biological performance in varying environments and market scenarios globally. Specific adjustments may be required depending on a range of factors, principally:

- Final product – live bird or portioned products – and meat product values.
- The supply and price of feed ingredients.
- Age and live weight at processing.
- Yield and carcass quality.
- Market requirements for skin color, shelf-life, etc.
- Use of sex-separate growing.

The most appropriate diets must be designed on a case-by-case basis with the objective of either minimizing costs for live bird production or maximizing margins over feed cost (MOFC) for portioned products. Optimizing the MOFC for portioned products, in most instances, can require an increased dietary amino acid density.

The energy values used in these specifications are based on assays for Metabolizable Energy published by the World's Poultry Science Association.

The digestible amino acid specifications were calculated according to the optimally balanced protein profile in Appendix 1. These values are based on Standardized Ileal Digestibility (SID) assays due to their accuracy in predicting performance outcomes in broiler diets formulated with a wide variety of raw materials. In addition, formulating on a digestible amino acid base avoids potential amino acid imbalances, improves nitrogen retention and reduces nitrogen excretion into the environment.

Total calcium and available phosphorus specifications were determined with corn/wheat-soybean-based diets to optimize both live performance and welfare characteristics. Limestone and monocalcium phosphate were the only supplemental sources of calcium and phosphorus used. As a reference, slow/intermediate soluble limestone (300-350 microns geometric mean diameter [GMD]) has been adopted in Aviagen trials, providing 55-60% of solubility at 5 minutes according to published methods.

Available phosphorus specifications are based on the classical availability system whereby a reference inorganic phosphorus source is described as 100% available, and plant sources are described as 33% available.

When using limestone sources with different solubilities, alternative raw materials, different phosphates, or enzymes, changes in the calcium and available phosphorus contributions are expected. Therefore, requiring the development of accurate matrices for such nutrients.

For further information regarding these recommendations or more specialized situations and advice on local markets, please contact your Aviagen® nutritionist or any Aviagen representative.

ROSS BROILER: Nutrition Specifications

Table 1: Nutrition Specifications for As-Hatched Broilers - Target Live Weight ≤ 2.0 kg (≤ 4.4 lb).

		Starter	Grower	Finisher
Age Fed	days	0 - 10	11 - 24	25 - market
Energy per kg	kcal	2975	3050	3100
	MJ	12.4	12.8	13.0
Energy per lb	kcal	1349	1383	1406
DIGESTIBLE AMINO ACIDS¹				
Lysine	%	1.32	1.18	1.08
Methionine + Cyst(e)ine	%	1.00	0.92	0.86
Methionine	%	0.55	0.51	0.48
Threonine	%	0.88	0.79	0.72
Valine	%	1.00	0.91	0.84
Isoleucine	%	0.88	0.80	0.75
Arginine	%	1.40	1.27	1.17
Tryptophan	%	0.21	0.19	0.17
Leucine	%	1.45	1.30	1.19
Crude Protein²	%	23.0	21.5	19.5
MINERALS				
Total Calcium	%	0.95	0.75	0.65
Available Phosphorus	%	0.50	0.42	0.36
Magnesium	%	0.05-0.30	0.05-0.30	0.05-0.30
Sodium	%	0.18-0.23	0.18-0.23	0.18-0.23
Chloride	%	0.18-0.23	0.18-0.23	0.18-0.23
Potassium	%	0.60-0.90	0.60-0.90	0.60-0.90
ADDED TRACE MINERALS PER KG				
Copper	mg	16	16	16
Iodine	mg	1.25	1.25	1.25
Iron	mg	20	20	20
Manganese	mg	120	120	120
Selenium	mg	0.30	0.30	0.30
Zinc	mg	120	120	120
ADDED VITAMINS PER KG				
Vitamin A	IU	13000	11000	10000
Vitamin D ₃	IU	5000	4500	4000
Vitamin E	IU	80	65	55
Vitamin K (Menadione)	mg	4.0	3.6	3.2
Thiamin (B ₁)	mg	5	4	3
Riboflavin (B ₂)	mg	9	8	7
Niacin	mg	70	65	50
Pantothenic Acid	mg	25	20	15
Pyridoxine (B ₆)	mg	5	4	3
Biotin	mg	0.35	0.28	0.22
Folic Acid	mg	2.5	2.0	1.8
Vitamin B ₁₂	mg	0.02	0.018	0.016
MINIMUM SPECIFICATION				
Choline per kg	mg	1700	1600	1500
Linoleic Acid	%	1.25	1.20	1.00

¹ To achieve the listed amino acid levels, adopting the use of either feed-grade amino acids or more complex diets may be necessary.

² Formulation should focus on achieving an adequate amino acid profile. These crude protein levels are not a requirement per se but instead are levels that can likely be achieved in corn/wheat and soybean meal-based diets and ensure a functional pool of non-essential amino acids.

NOTES: These feed specifications should be used as a guide only. Adjustments may be necessary for local conditions, legislation and markets. A withdrawal feed should be fed to meet local requirements for medication withdrawal times and can be formulated to the same standards as the final feed listed above.

ROSS BROILER: Nutrition Specifications

Table 2: Nutrition Specifications for As-Hatched Broilers - Target Live Weight 2.0 - 3.5 kg (3.75 - 5.30 lb).

		Starter	Grower	Finisher 1	Finisher 2
Age Fed	days	0-10	11-24	25 -39	40-market
Energy per kg	kcal	2975	3050	3100	3125
	MJ	12.4	12.8	13.0	13.1
Energy per lb	kcal	1349	1383	1406	1417
DIGESTIBLE AMINO ACIDS¹					
Lysine	%	1.32	1.18	1.08	1.02
Methionine + Cyst(e)ine	%	1.00	0.92	0.86	0.82
Methionine	%	0.55	0.51	0.48	0.45
Threonine	%	0.88	0.79	0.72	0.68
Valine	%	1.00	0.91	0.84	0.80
Isoleucine	%	0.88	0.80	0.75	0.70
Arginine	%	1.40	1.27	1.17	1.12
Tryptophan	%	0.21	0.19	0.17	0.16
Leucine	%	1.45	1.30	1.19	1.12
Crude Protein²	%	23.0	21.5	19.5	18.0
MINERALS					
Total Calcium	%	0.95	0.75	0.65	0.60
Available Phosphorus	%	0.50	0.42	0.36	0.34
Magnesium	%	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30
Sodium	%	0.18-0.23	0.18-0.23	0.18-0.23	0.18-0.23
Chloride	%	0.18-0.23	0.18-0.23	0.18-0.23	0.18-0.23
Potassium	%	0.60-0.90	0.60-0.90	0.60-0.90	0.60-0.90
ADDED TRACE MINERALS PER KG					
Copper	mg	16	16	16	16
Iodine	mg	1.25	1.25	1.25	1.25
Iron	mg	20	20	20	20
Manganese	mg	120	120	120	120
Selenium	mg	0.30	0.30	0.30	0.30
Zinc	mg	120	120	120	120
ADDED VITAMINS PER KG					
Vitamin A	IU	13000	11000	10000	10000
Vitamin D ₃	IU	5000	4500	4000	4000
Vitamin E	IU	80	65	55	55
Vitamin K (Menadione)	mg	4.0	3.6	3.2	3.2
Thiamin (B ₁)	mg	5	4	3	3
Riboflavin (B ₂)	mg	9	8	7	7
Niacin	mg	70	65	50	50
Pantothenic Acid	mg	25	20	15	15
Pyridoxine (B ₆)	mg	5	4	3	3
Biotin	mg	0.35	0.28	0.22	0.22
Folic Acid	mg	2.5	2.0	1.8	1.8
Vitamin B ₁₂	mg	0.02	0.018	0.016	0.016
MINIMUM SPECIFICATION					
Choline per kg	mg	1700	1600	1500	1450
Linoleic Acid	%	1.25	1.20	1.00	1.00

¹ To achieve the listed amino acid levels, adopting the use of either feed-grade amino acids or more complex diets may be necessary.

² Formulation should focus on achieving an adequate amino acid profile. These crude protein levels are not a requirement per se but instead are levels that can likely be achieved in corn/wheat and soybean meal-based diets and ensure a functional pool of non-essential amino acids.

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Table 3: Nutrition Specifications for As-Hatched Broilers - Target Live Weight >3.5 kg (>7.7 lb).

		Starter	Grower	Finisher 1	Finisher 2	Finisher 3
Age Fed	days	0-10	11-24	25 -39	40-51	52 -market
Energy per kg	kcal	2975	3050	3100	3125	3150
	MJ	12.4	12.8	13.0	13.1	13.2
Energy per lb	kcal	1349	1383	1406	1417	1429
DIGESTIBLE AMINO ACIDS¹						
Lysine	%	1.32	1.18	1.08	1.02	0.96
Methionine + Cyst(e)ine	%	1.00	0.92	0.86	0.82	0.77
Methionine	%	0.55	0.51	0.48	0.45	0.42
Threonine	%	0.88	0.79	0.72	0.68	0.64
Valine	%	1.00	0.91	0.84	0.80	0.77
Isoleucine	%	0.88	0.80	0.75	0.70	0.67
Arginine	%	1.40	1.27	1.17	1.12	1.08
Tryptophan	%	0.21	0.19	0.17	0.16	0.15
Leucine	%	1.45	1.30	1.19	1.12	1.06
Crude Protein²	%	23.0	21.5	19.5	18.0	17.0
MINERALS						
Total Calcium	%	0.95	0.75	0.65	0.60	0.55
Available Phosphorus	%	0.50	0.42	0.36	0.34	0.32
Magnesium	%	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30	0.05-0.30
Sodium	%	0.18-0.23	0.18-0.23	0.18-0.23	0.18-0.23	0.18-0.23
Chloride	%	0.18-0.23	0.18-0.23	0.18-0.23	0.18-0.23	0.18-0.23
Potassium	%	0.60-0.90	0.60-0.90	0.60-0.90	0.60-0.90	0.60-0.90
ADDED TRACE MINERALS PER KG						
Copper	mg	16	16	16	16	16
Iodine	mg	1.25	1.25	1.25	1.25	1.25
Iron	mg	20	20	20	20	20
Manganese	mg	120	120	120	120	120
Selenium	mg	0.30	0.30	0.30	0.30	0.30
Zinc	mg	120	120	120	120	120
ADDED VITAMINS PER KG						
Vitamin A	IU	13000	11000	10000	10000	10000
Vitamin D ₃	IU	5000	4500	4000	4000	4000
Vitamin E	IU	80	65	55	55	55
Vitamin K (Menadione)	mg	4.0	3.6	3.2	3.2	3.2
Thiamin (B ₁)	mg	5	4	3	3	3
Riboflavin (B ₂)	mg	9	8	7	7	7
Niacin	mg	70	65	50	50	50
Pantothenic Acid	mg	25	20	15	15	15
Pyridoxine (B ₆)	mg	5	4	3	3	3
Biotin	mg	0.35	0.28	0.22	0.22	0.22
Folic Acid	mg	2.5	2.0	1.8	1.8	1.8
Vitamin B ₁₂	mg	0.02	0.018	0.016	0.016	0.016
MINIMUM SPECIFICATION						
Choline per kg	mg	1700	1600	1500	1450	1450
Linoleic Acid	%	1.25	1.20	1.00	1.00	1.00

¹ To achieve the listed amino acid levels, adopting the use of either feed-grade amino acids or more complex diets may be necessary.

² Formulation should focus on achieving an adequate amino acid profile. These crude protein levels are not a requirement per se but instead are levels that can likely be achieved in corn/wheat and soybean meal-based diets and ensure a functional pool of non-essential amino acids.

NOTES: These feed specifications should be used as a guide only. Adjustments may be necessary for local conditions, legislation and markets. A withdrawal feed should be fed to meet local requirements for medication withdrawal times and can be formulated to the same standards as the final feed listed above.

Appendix 1 - Ratios for an optimally balanced protein profile.

		Age Fed - days				
		0-10	11-24	25 -39	40-51	> 52
Lysine	%	100	100	100	100	100
Methionine + Cyst(e)ine	%	76	78	80	80	80
Methionine	%	42	43	44	44	44
Threonine	%	67	67	67	67	67
Valine	%	76	77	78	78	80
Isoleucine	%	67	68	69	69	70
Arginine	%	106	108	108	110	112
Tryptophan	%	16	16	16	16	16
Leucine	%	110	110	110	110	110

NOTE: The information in the table is derived from Aviagen internal trials and published literature.



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