

Table S1. Ingredient composition and nutrient content of basal diets (g/100 g, as-fed basis) ¹.

| Item | Feeding Period, Weeks | | | |
|-------------------------------------|-----------------------|-------|--------|---------|
| | 1 – 4 | 5 – 8 | 9 – 12 | 13 – 16 |
| Ingredients | | | | |
| Wheat | 46.37 | 48.67 | 53.74 | 65.63 |
| Maize | 10.00 | 10.00 | 10.00 | 10.00 |
| Soybean meal | 25.05 | 23.27 | 18.73 | 7.91 |
| Rapeseed meal | 3.00 | 5.00 | 7.18 | 7.00 |
| Potato protein | 5.52 | 3.01 | - | - |
| Soybean oil | 0.20 | 2.32 | 3.53 | 3.22 |
| Maize gluten meal | 5.50 | 3.50 | 3.50 | 3.50 |
| Sodium bicarbonate | 0.20 | 0.20 | 0.20 | 0.20 |
| Sodium chloride | 0.15 | 0.16 | 0.16 | 0.14 |
| Limestone | 2.20 | 1.86 | 1.64 | 1.38 |
| Monocalcium phosphate | 1.46 | 1.29 | 0.90 | 0.50 |
| L-Threonine | - | 0.07 | 0.07 | 0.17 |
| Choline chloride | 0.10 | 0.10 | 0.10 | 0.10 |
| Vitamin-mineral premix ² | 0.25 | 0.25 | 0.25 | 0.25 |
| Titanium oxide | - | 0.30 | - | - |
| Calculated nutrient content | | | | |
| Metabolizable energy, kcal/kg | 2 825 | 2 900 | 3 000 | 3 100 |
| Crude protein | 26.50 | 23.50 | 20.50 | 17.00 |
| Lysine total | 1.28 | 1.12 | 0.89 | 0.64 |
| Arginine total | 1.44 | 1.35 | 1.17 | 0.89 |
| Methionine total | 0.45 | 0.39 | 0.34 | 0.29 |
| Methionine + Cysteine total | 0.92 | 0.82 | 0.74 | 0.65 |
| Threonine total | 1.02 | 0.95 | 0.80 | 0.75 |
| Calcium | 1.25 | 1.10 | 0.95 | 0.75 |
| Available phosphorus | 0.65 | 0.55 | 0.47 | 0.38 |

¹ Source: This table was published in Poultry Science, 99 Jan Jankowski, Dariusz Mikulski, Marzena Mikulska, Katarzyna Ognik, Zuzanna Całyniuk, Emilia Mróz, Zenon Zduńczyk, The effect of different dietary ratios of arginine, methionine, and lysine on the performance, carcass traits, and immune status of turkeys, 1028–1031, Copyright © Poultry Science Association. Published by Elsevier Inc. All rights reserved (2020). ² Provided per kg of diet (feeding periods: weeks 1 – 4, 5 – 8, 9 – 12 and 13 – 16): mg: all-trans retinol 3.78, 3.38, 2.88 and 2.52; cholecalciferol 0.13, 0.12, 0.10 and 0.09; α -tocopheryl acetate 100, 90, 80 and 70; vit. K₃ 5.8, 5.6, 4.8 and 4.2; thiamine 5.4, 4.7, 4.0 and 3.5; riboflavin 8.4, 7.5, 6.4 and 5.6; pyridoxine 6.4, 5.6, 4.8 and 4.2; cobalamin 0.032, 0.028, 0.024 and 0.021; biotin 0.32, 0.28, 0.24 and 0.21; pantothenic acid 28, 24, 20 and 18; nicotinic acid 84, 75, 64 and 56; folic acid 3.2, 2.8, 2.4 and 2.1; Fe 64, 60, 56, 48 and 42; Mn 120, 112, 96 and 84; Zn 110, 103, 88 and 77; Cu 23, 19, 16 and 14; I 3.2, 2.8, 2.4 and 2.1; Se 0.30, 0.28, 0.24 and 0.21, respectively.

Table S2. Amino acids added to basal diets (g/100g) ¹.

| Feeding Period, Weeks | Amino Acid | Treatment ² | | | | | |
|-----------------------|-----------------------------|------------------------|------------|-------------|-------------|-------------|-------------|
| | | Arg90Met30 | Arg90Met45 | Arg100Met30 | Arg100Met45 | Arg110Met30 | Arg110Met45 |
| 1–4 | L-Lysine HCl ³ | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| | L-Arginine HCL ⁴ | 0 | 0 | 0.13 | 0.13 | 0.28 | 0.28 |
| | DL-Methionine ⁵ | 0.03 | 0.27 | 0.03 | 0.27 | 0.03 | 0.27 |
| 5–8 | L-Lysine HCl | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 |
| | L-Arginine HCL | 0 | 0 | 0.13 | 0.13 | 0.28 | 0.28 |
| | DL-Methionine | 0.06 | 0.29 | 0.06 | 0.29 | 0.06 | 0.29 |
| 9–12 | L-Lysine HCl | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 |
| | L-Arginine HCL | 0 | 0 | 0.11 | 0.11 | 0.24 | 0.24 |
| | DL-Methionine | 0.05 | 0.25 | 0.05 | 0.25 | 0.05 | 0.25 |

| | | | | | | | |
|-------|----------------|------|------|------|------|------|------|
| 13—16 | L-Lysine HCl | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 |
| | L-Arginine HCL | 0 | 0 | 0.09 | 0.09 | 0.19 | 0.19 |
| | DL-Methionine | 0 | 0.12 | 0 | 0.12 | 0 | 0.12 |

¹ Source: This table was published in Poultry Science, 99 Jan Jankowski, Dariusz Mikulski, Marzena Mikulska, Katarzyna Ognik, Zuzanna Całyniuk, Emilia Mróz, Zenon Zduńczyk, The effect of different dietary ratios of arginine, methionine, and lysine on the performance, carcass traits, and immune status of turkeys, 1028–1031, Copyright © Poultry Science Association. Published by Elsevier Inc. All rights reserved (2020). ² Actual levels of supplementary Lys, Arg and Met in experimental diets were obtained by adding supplementary L-Lys HCL, L-Arg HCL and DL-Met on top to the basal diet. ³ L-Lysine HCL (Ajinomoto Eurolysine S.A.S, Amiens, France, 780 g lysine /kg) was added to the basal diet to provide 1.60, 1.50, 1.30 and 1.00 g of Lys per 100 g of feed in four successive feeding periods, according to the nutrient requirements of turkeys (NRC, 1994). ⁴ L-Arginine HCL (Ajinomoto Eurolysine S.A.S, Amiens, France, 990 g arginine /kg) was added to the basal diet to provide 90%, 100% and 110% of Arg relative to the content of dietary Lys. ⁵ DL-Methionine (MetAMINO®, Evonik Degussa GmbH, Essen, Germany, 990 g methionine/kg) was added to provide 30% and 45% of Met relative to the content of dietary Lys.

Table S3. Analyzed total amino acid contents of the experimental diets (%).

| Feeding Period, Weeks | Amino Acid | Treatment ¹ | | | | | |
|-----------------------|-------------------------------|------------------------|------------|-------------|-------------|-------------|-------------|
| | | Arg90Met30 | Arg90Met45 | Arg100Met30 | Arg100Met45 | Arg110Met30 | Arg110Met45 |
| 1—4 | Lysine | 1.63 | 1.56 | 1.58 | 1.66 | 1.55 | 1.64 |
| | Arginine | 1.46 | 1.43 | 1.52 | 1.56 | 1.69 | 1.67 |
| | Met + Cys (TSAA) | 0.96 | 1.15 | 0.97 | 1.17 | 0.98 | 1.20 |
| | TSAA : Lys ratio ² | 59.02 | 73.85 | 61.52 | 70.60 | 63.35 | 73.29 |
| | Met : TSAA ratio ² | 51.97 | 59.90 | 52.47 | 60.58 | 52.95 | 61.56 |
| 5—8 | Lysine | 1.48 | 1.45 | 1.53 | 1.56 | 1.56 | 1.55 |
| | Arginine | 1.37 | 1.39 | 1.53 | 1.56 | 1.71 | 1.73 |
| | Met + Cys (TSAA) | 0.83 | 1.07 | 0.83 | 1.11 | 0.85 | 1.07 |
| | TSAA : Lys ratio ² | 56.01 | 73.72 | 54.18 | 71.09 | 54.42 | 68.97 |
| | Met : TSAA ratio ² | 50.66 | 61.74 | 50.66 | 63.12 | 51.82 | 61.74 |
| 9—12 | Lysine | 1.27 | 1.29 | 1.34 | 1.28 | 1.36 | 1.32 |
| | Arginine | 1.18 | 1.20 | 1.34 | 1.26 | 1.45 | 1.43 |
| | Met + Cys (TSAA) | 0.76 | 0.99 | 0.79 | 0.97 | 0.76 | 0.97 |
| | TSAA : Lys ratio ² | 59.61 | 76.51 | 58.73 | 75.55 | 55.66 | 73.26 |
| | Met : TSAA ratio ² | 50.20 | 61.80 | 52.10 | 61.01 | 50.20 | 61.01 |
| 13—16 | Lysine | 1.01 | 0.99 | 1.03 | 1.04 | 0.96 | 0.97 |
| | Arginine | 0.92 | 0.91 | 1.05 | 1.03 | 1.12 | 1.16 |
| | Met + Cys (TSAA) | 0.66 | 0.79 | 0.64 | 0.75 | 0.65 | 0.81 |
| | TSAA : Lys ratio ² | 65.74 | 80.20 | 62.52 | 72.5 | 68.12 | 83.92 |
| | Met : TSAA ratio ² | 49.70 | 57.93 | 48.14 | 55.70 | 48.93 | 58.97 |

TSAA = Total sulfur amino acid. ¹ Treatment: Arg90Met30 received 90% Arg and 30% Met relative to the content of dietary Lys; Arg90Met45 received 90% Arg and 45% Met relative to the content of dietary Lys; Arg100Met30 received 100% Arg and 30% Met relative to the content of dietary Lys; Arg100Met45 received 100% Arg and 45% Met relative to the content of dietary Lys; Arg110Met30 received 110% Arg and 30% Met relative to the content of dietary Lys; Arg110Met45 received 110% Arg level and 45% Met level relative to the content of dietary Lys. ² Calculated.

Table S4. Proportions of thigh and interscapular feathers (combined) in different growth stages in 4-week-old turkeys.

| Item | Average Number of Feathers | Feather Growth Stage ¹ | | | | |
|--|----------------------------|-----------------------------------|-------|-------|-------|-------|
| | | I | II | III | IV | V |
| Treatment (<i>n</i> = 8) ² | | | | | | |
| Arg90Met30 | 97.13 | 8.84 | 14.69 | 17.85 | 29.55 | 29.06 |
| Arg90Met45 | 104.13 | 9.17 | 18.66 | 23.37 | 29.17 | 19.62 |
| Arg100Met30 | 96.63 | 12.20 | 12.48 | 24.71 | 27.24 | 23.36 |
| Arg100Met45 | 104.25 | 8.31 | 14.57 | 21.95 | 32.69 | 22.48 |

| | | | | | | |
|-----------------------|--------|-------|-------|-------|-------|-------|
| Arg110Met30 | 112.13 | 8.15 | 19.45 | 17.94 | 28.35 | 26.11 |
| Arg110Met45 | 111.0 | 7.11 | 19.37 | 21.05 | 26.91 | 25.55 |
| SEM | 4.435 | 0.637 | 1.020 | 1.102 | 1.060 | 1.152 |
| Arginine, % | | | | | | |
| 90 | 100.63 | 9.01 | 16.68 | 20.61 | 29.36 | 24.34 |
| 100 | 100.44 | 10.26 | 13.53 | 23.33 | 29.97 | 22.92 |
| 110 | 111.56 | 7.63 | 19.41 | 19.50 | 27.63 | 25.83 |
| Methionine, % | | | | | | |
| 30 | 101.96 | 9.37 | 15.54 | 20.17 | 28.38 | 26.18 |
| 45 | 106.46 | 8.20 | 17.54 | 22.12 | 29.59 | 22.55 |
| <i>P</i> value | | | | | | |
| Arg | 0.533 | 0.238 | 0.116 | 0.376 | 0.618 | 0.517 |
| Met | 0.627 | 0.257 | 0.234 | 0.407 | 0.641 | 0.103 |
| Arg × Met interaction | 0.910 | 0.389 | 0.548 | 0.285 | 0.372 | 0.226 |

¹ Growth stage of feathers: I – pinfeathers covered in sheaths, II – beginning of vane development, III – feathers unsheathed by ½ of rachis length, IV – feathers unsheathed by ¾ of rachis length, V – mature feathers. ² Treatment: Arg90Met30 received 90% Arg level and 30% Met level relative to the content of dietary Lys; Arg90Met45 received 90% Arg level and 45% Met level relative to the content of dietary Lys; Arg100Met30 received 100% Arg level and 30% Met level relative to the content of dietary Lys; Arg100Met45 received 100% Arg level and 45% Met level relative to the content of dietary Lys; Arg110Met30 received 110% Arg level and 30% Met level relative to the content of dietary Lys; Arg110Met45 received 110% Arg level and 45% Met level relative to the content of dietary Lys.

Table S5. Proportions of thigh and interscapular feathers (combined) in different growth stages in 16-week-old turkeys.

| Item | Average Number of Feathers | Feather Growth Stage ¹ | | | | |
|--|----------------------------|-----------------------------------|-------------------|-------|--------------------|--------------------|
| | | I | II | III | IV | V |
| Treatment (<i>n</i> = 8) ² | | | | | | |
| Arg90Met30 | 131.63 | 0.67 | 3.93 ^a | 9.02 | 31.73 | 54.64 |
| Arg90Met45 | 137.88 | 1.34 | 3.84 ^a | 8.39 | 18.71 | 67.72 |
| Arg100Met30 | 141.00 | 1.90 | 3.70 ^a | 9.55 | 25.72 | 59.13 |
| Arg100Met45 | 137.63 | 1.13 | 3.07 ^a | 5.80 | 22.42 | 67.58 |
| Arg110Met30 | 142.50 | 1.06 | 4.57 ^a | 7.39 | 27.03 | 59.96 |
| Arg110Met45 | 139.38 | 0.59 | 0.93 ^b | 4.97 | 23.63 | 69.88 |
| SEM | 2.446 | 0.215 | 0.317 | 0.590 | 1.060 | 1.394 |
| Arginine, % | | | | | | |
| 90 | 134.75 | 1.01 | 3.89 | 8.70 | 25.22 | 61.18 |
| 100 | 139.31 | 1.51 | 3.38 | 7.68 | 24.07 | 63.36 |
| 110 | 140.93 | 0.82 | 2.75 | 6.18 | 25.33 | 64.92 |
| Methionine, % | | | | | | |
| 30 | 138.38 | 1.21 | 4.07 ^a | 8.65 | 28.16 ^a | 57.91 ^b |
| 45 | 138.29 | 1.02 | 2.61 ^b | 6.39 | 21.59 ^b | 68.39 ^a |
| <i>P</i> value | | | | | | |
| Arg | 0.590 | 0.322 | 0.087 | 0.175 | 0.823 | 0.431 |
| Met | 0.986 | 0.767 | 0.010 | 0.068 | 0.001 | 0.001 |
| Arg × Met interaction | 0.679 | 0.450 | 0.008 | 0.369 | 0.065 | 0.748 |

¹ Growth stage of feathers: I – pinfeathers covered in sheaths, II – beginning of vane development, III – feathers unsheathed by ½ of rachis length, IV – feathers unsheathed by ¾ of rachis length, V – mature feathers. ² Treatment: Arg90Met30 received 90% Arg level and 30% Met level relative to the content of dietary Lys; Arg90Met45 received 90% Arg level and 45% Met level relative to the content of dietary Lys; Arg100Met30 received 100% Arg level and 30% Met level relative to the content of dietary Lys; Arg100Met45 received 100% Arg level and 45% Met level relative to the content of dietary Lys; Arg110Met30 received 110% Arg level and 30% Met level relative to the content of dietary Lys; Arg110Met45 received 110% Arg level and 45% Met level relative to the content of dietary Lys. ^{a,b} Means within the same column with different superscripts differ significantly (*p* < 0.05).