Additivity of digestible amino acids in hatchery byproducts fed to nursery pigs

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Introduction

- Additivity of nutrients is the fundamental assumption when formulating diets
- Hatchery byproducts (infertile eggs, unhatched eggs, and culled chicks) are regarded as potential alternative protein sources in nursery pig diets (Sung and Kim, 2020)
- In swine diets, a hatchery byproduct mixture is likely to be used rather than a single byproduct as hatchery byproducts are pooled and then discarded together
- However, ileal digestibility of amino acids (AA) and additivity of ileal digestible AA in hatchery byproducts have not been reported
- Therefore, the objectives were to determine ileal AA digestibility in hatchery byproducts and to test the additivity of digestible AA in a hatchery byproduct mixture fed to nursery pigs

Materials and Methods

- Ten T-cannulated barrows (11.3 ± 1.3 kg BW) were used
- A replicated 5 × 4 Latin square design with 5 diets (Table 1) and 4 periods was employed (n = 8)

Table 1. Ingredient composition of experimental diets

Ingredient, %	Infertile eggs	Unhatched eggs	Culled chicks	Mixture[1]	N-free
Cornstarch	47.93	48.01	47.99	48.25	68.00
Sucrose	20.00	20.00	20.00	20.00	20.00
Infertile eggs	30.00	-	-	-	-
Unhatched eggs	-	30.00	-	-	-
Culled chicks	-	-	30.00	-	-
Mixture	-	-	-	30.00	
Others	2.07	1.99	2.01	1.75	12.0

[1]A mixture contained 20% dried infertile eggs, 20% dried unhatched eggs, and 60% dried culled chicks.

- Period = 4-d adaptation + 3-d ileal digesta collection
- PROC MIXED of SAS (SAS Inst. Inc., Cary, NC) was used
- A *t*-test was used to compare measured digestible AA concentrations with predicted values in the mixture

Results

Table 2. Standardized ileal digestibility (%) of AA in hatchery byproducts (n = 8)

Item	Infertile eggs	Unhatched eggs	Culled chicks	Mixture	SEM	*P*-value
Lysine	81.0	79.3	77.7	79.5	2.6	0.740
Methionine	83.6	81.0	80.9	83.4	2.4	0.606
Threonine	78.8^{a}	75.0^{ab}	65.2^{b}	70.0^{ab}	3.0	0.010
Tryptophan	83.3^{a}	77.4^{ab}	51.3^{c}	69.4^{b}	3.0	< 0.001

Table 3. Measured and predicted values for standardized ileal digestible AA concentrations (%) in the hatchery byproduct mixture, as-is basis (n = 8)

Item	Measured	Predicted	Standard error	*P*-value
Lysine	2.01	2.08	0.08	0.700
Methionine	0.83	0.83	0.03	0.565
Threonine	1.20	1.25	0.07	0.731
Tryptophan	0.31	0.25	0.02	0.004

Conclusion

- Standardized ileal digestible AA concentrations in a hatchery byproduct mixture are additive except for tryptophan

Reference

- Sung, J. Y., and B. G. Kim. 2020. Effects of a hatchery byproduct mixture on growth performance and digestible energy of various hatchery byproduct mixtures in nursery pigs. Animals 10:174.