Effect of a *Saccharomyces cerevisiae* alpha-galactosidase based enzyme formulation on the performance and apparent metabolizable energy of broiler chickens: a meta-analysis

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Introduction

AlphaGal™ 280P is a unique α-galactosidase based multicarbohydrase, which has been proven to increase the valorization of broiler feed formulations in multiple independent randomized controlled trials, conducted worldwide. The objective of this study was to complete a meta-analysis to extrapolate pertinent qualitative and quantitative data, which could be used to determine the impact of AlphaGal™ 280P on the performance and nutrient digestibility of broilers.

Materials & Methods

Following a systematic review, 120 studies were identified. These were filtered based on those involving the performance and digestibility assessment of AlphaGal™ 280P on broiler chickens, of which there were 23 studies identified and included in this evaluation (Fig. 1.). The *metafor* package in *RStudio* was used to conduct the meta-analysis. Mean difference was Hedge's effect size estimate calculated by subtracting the mean body weight (BW) and feed conversion ratio (FCR) at 35, 42 and 49 days, as well as the apparent metabolizable energy (AME_n), respectively to the control group. The pooled standard error of the mean (SEM) represented the sampling error. Corrective actions were undertaken to ensure compliance regarding publication bias and heterogeneity of the combined dataset, assessed by the Egger test and the Cochran Q test, separately.

SYSTEMATIC REVIEW
Total number of studies found: **120**

SCREENED DATASET
Broiler chicken studies: **77**

AlphaGal™ 280P

PERFORMANCE
16 Studies
11,314 Broilers
338 Replicates

DIGESTIBILITY
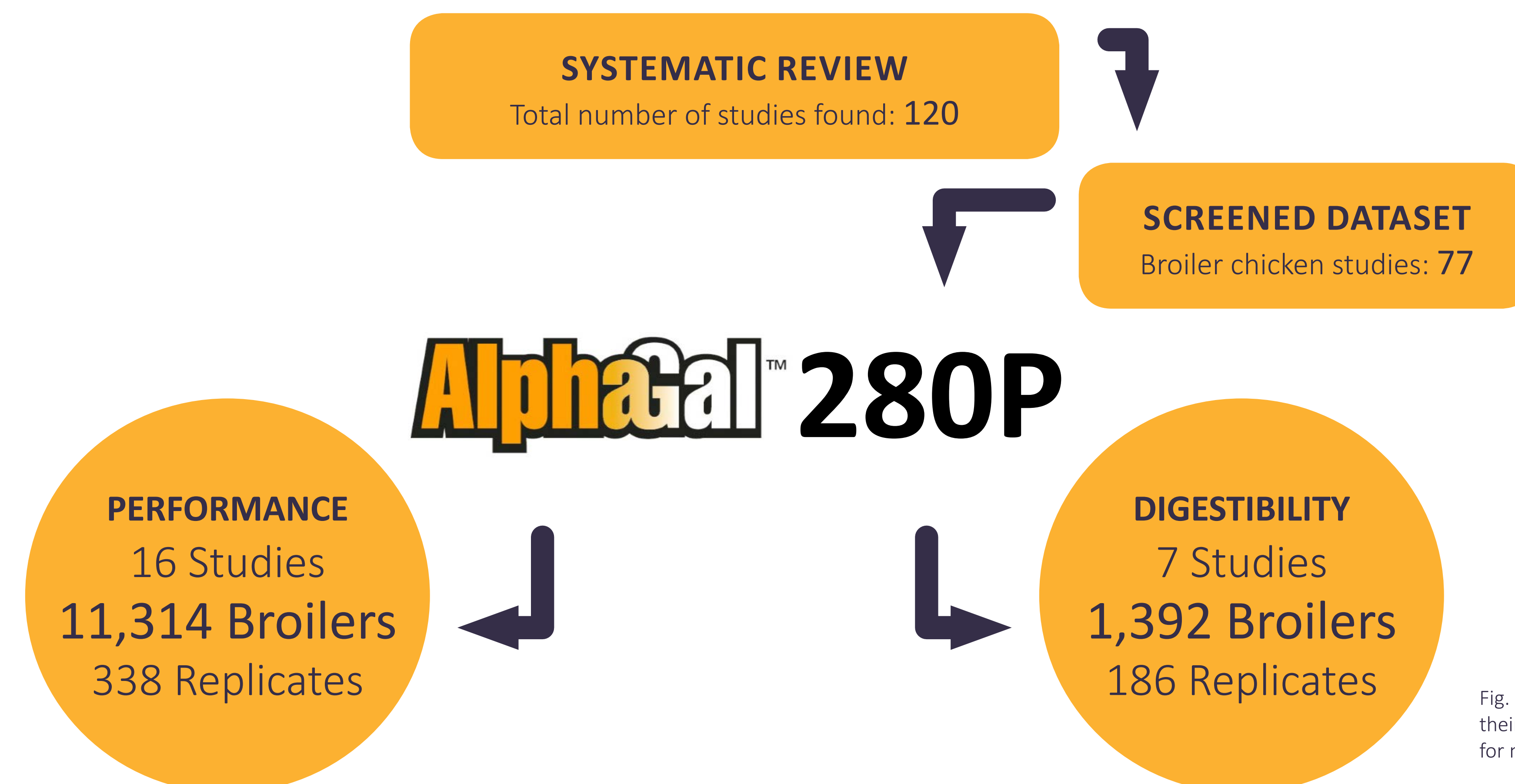7 Studies
1,392 Broilers
186 Replicates

Fig. 1. Schematic representation of the systematic review of studies, their quantification and the number of broilers and replicates selected for meta-analysis.

PERFORMANCE STUDIES

BW P=0.0002 ↑ **+2.3%**

FCR P=0.0030 ↓ **-2.8%**

DIGESTIBILITY STUDIES

AMEₙ P=0.0001 ↑ **+58 kcal/kg**

Results

Significant effects of AlphaGal™ 280P supplementation were illustrated by increases in BW of up to 2.3% (p=0.0002), concomitant with improvements in FCR of 2.8% (p=0.0030). The meta-analysis highlighted significant increments in dietary AME_n, quantified as an additional 58 kcal/kg feed (p=0.0001).

BW (Observed Outcome)

Study	Effect (95% CI)
US10-1	1.11 (0.20, 2.02)
IN12-1	0.78 (-0.48, 2.04)
IN14-1	0.23 (-0.52, 0.98)
US17-1	0.24 (-0.60, 1.09)
US17-2	0.87 (0.06, 1.68)
US17-3	-0.36 (-1.14, 0.42)
BR17-1	0.65 (-0.30, 1.61)
US14-1	0.33 (-0.45, 1.11)
RE Model	0.43 (0.10, 0.76)

FCR (Observed Outcome)

Study	Effect (95% CI)
IN12-1	-1.37 (-2.75, 0.01)
MX14-1	-0.30 (-1.03, 0.42)
US17-1	-0.76 (-1.64, 0.11)
US17-2	-0.35 (-1.13, 0.43)
US17-3	-0.39 (-1.17, -0.39)
BR17-1	-0.04 (-0.97, 0.88)
US14-1	-0.74 (-1.54, -0.06)
RE Model	-0.48 (-0.80, -0.16)

AMEₙ (Observed Outcome)

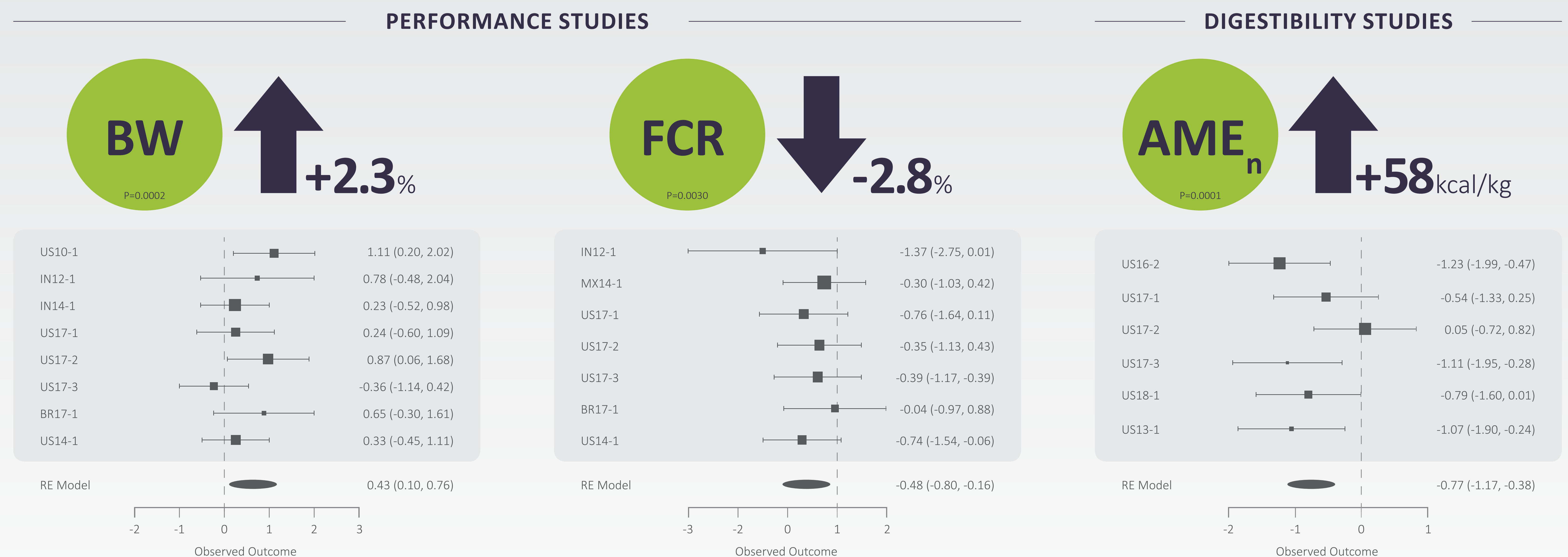| Study	Effect (95% CI)
US16-2	-1.23 (-1.99, -0.47)
US17-1	-0.54 (-1.33, 0.25)
US17-2	0.05 (-0.72, 0.82)
US17-3	-1.11 (-1.95, -0.28)
US18-1	-0.79 (-1.60, 0.01)
US13-1	-1.07 (-1.90, -0.24)
RE Model	-0.77 (-1.17, -0.38)

Fig. 2. Forest plot showing mean difference effect and confidence interval of AlphaGal™ 280P supplementation on body weight (BW), feed conversion ratio (FCR) to 42 days, and nitrogen-corrected apparent metabolizable energy (AME_n) in broilers

Conclusions

This meta-analysis was completed using 23 independent randomized controlled trials, conducted worldwide. It confirms with greater statistical significance that AlphaGal™ 280P, α-galactosidase based enzyme formulation is an effective strategy in improving the performance and apparent metabolizable energy of broiler chickens.

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