**Application**

In male and female heavy Duroc X (Landrace X Large White) finishing pigs, reduced Crude Protein (CP) with amino acid (AA) supplementation feeding strategies are economically viable under high or low feed and carcass prices scenarios.

**Introduction**

Nutrition represents 70% of pig production costs, particularly protein feedstuffs. Reducing feeding costs is of major relevance, particularly in heavy pigs finished until 120kg. Decreasing CP contents below recommended supplemented with AA is effective in decreasing costs without affecting production performances and profitability under particular scenarios (Almeida et al., 2024a). The strategy has been conducted in lean genotypes in post-weaning piglets and grower stages, with few studies concerning heavy male and female finishers. Herein, we conduct an economic assessment in heavy (Duroc X (Landrace X Large White)) male and female finishing pigs under a 2% CP reduction with AA supplementation under four scenarios (low feed and carcass prices and high feed and carcass prices). We hypothesize that for both sexes and scenarios the CP reduction coupled to AA supplementation is economically viable.

**Materials and Methods**

A total of 60 males and 60 females heavy (Duroc X (Landrace X Large White) finishers were used. At 9 weeks, pigs were distributed in split-sex pens (6 pigs/pen) with ad libitum access to water and feed. At 15 weeks, two isoenergetic diets with different CP levels were provided (145 and 125 g CP/kg, control and low-CP) during 42 days when all animals were slaughtered. Low-CP pigs were supplemented higher levels of crystalline AAs to meet equal ideal protein balance. Males were 7.25% heavier and had 16% higher average daily gains than females in both treatments with no differences recorded for feed intake or feed conversion ratio (Almeida et al., 2024b; 2024c). Feed costs and carcass incomes were calculated for best and least favourable scenarios in weekly prices over the last three years. Feed price of the control diet matched mean values of finishing feed in Spain for that period. Feed costs were calculated by multiplying feed prices (€/kg of feed) by the amount of feed consumed during the experiment (in kg/pig) plus a fixed partial fixed feed cost of 80 €/pig from 6 to 70 kg of body weight (start of the experiment). Carcass income (€/pig) was obtained by multiplying carcass prices (€/kg of carcass) by carcass weight (kg of carcass). Margin-over-feed-cost (€/pig) was calculated as the difference between carcass income and feed costs. Data was analyzed using the simple least squares models that included dietary treatment and sex and their interaction as fixed effects with the pen (n=20) as the experimental unit. The University of Lleida Ethics Committee (CEEA 01/23) approved the protocol.

**Results**

Results are detailed in Table 1. In the first two scenarios (concomitant low feed costs and carcass incomes, as well as high feed costs and carcass incomes), decreased CP contents with AA supplementation lead to analogous feed costs for all experimental groups. Results are different regarding carcass incomes and margin-over-feed costs, as for both remaining scenarios (contrasting high and low feed costs with low and high carcass incomes), the males had higher margins over feed costs than females for both diets. Concerning the low feed and high carcass prices scenario, control males had higher margins than low-CP females, whereas low-CP males and control females showed intermediate values.

Table 1. Economic assessment of the effect of low CP diet with amino acid supplementation on entire male and female pigs

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Diet-Sex** | **SEM** | **P-value** |
|  | **Low-CP Female** | **Low-CP Male** | **Control-CP Female** | **Control-CP Male** | **Diet** | **Sex** | **Diet x Sex** |
| **Low feed and carcass prices scenario (2020)1** |
| Feed cost (€/pig) | 112.05 | 112.69 | 112.52 | 113.07 | 0.788 | 0.599 | 0.461 | 0.956 |
| Carcass income (€/pig) | 142.04c | 150.00ab | 143.99bc | 152.64a | 1.647 | 0.182 | <0.001 | 0.833 |
| Margin-over-feed-cost (€/pig) | 29.99b | 37.30a | 31.47b | 39.57a | 1.249 | 0.153 | <0.001 | 0.754 |
| **High feed and carcass prices scenario (2022)2** |
| Feed cost (€/pig) | 133.17 | 134.23 | 135.92 | 136.87 | 1.325 | 0.059 | 0.459 | 0.967 |
| Carcass income (€/pig) | 177.09b | 184.70ab | 179.39ab | 188.10a | 3.281 | 0.397 | 0.024 | 0.869 |
| Margin-over-feed-cost (€/pig) | 43.91b | 50.46a | 43.47b | 51.23a | 3.309 | 0.962 | 0.046 | 0.857 |
| **High feed and low carcass prices** |
| Margin-over-feed-cost (€/pig) | 8.87b | 15.76a | 8.06b | 15.77a | 1.223 | 0.749 | <0.001 | 0.742 |
| **Low feed and high carcass prices** |
| Margin-over-feed-cost (€/pig) | 65.03b | 72.00ab | 66.87ab | 75.03a | 3.230 | 0.463 | 0.032 | 0.856 |
| a,b Lines with different superscripts indicate significant differences (p<0.05); 1Feed prices for the most favorable scenario were 0.258 €/kg and 0.264 €/kg (+6 €/t) in the control and low-CP feeds, respectively. Prices of the control diet was set according to mean values of finishing feed in Spain during 2020; 2Feed prices for the least favorable scenario were 0.428 €/kg and 0.454 €/kg (+26 €/t) in control and the low-CP feeds, respectively. The feed price of the control diet was set according to mean values of finishing feed in Spain in 2022 |

**Conclusions**

Reduced CP feeding strategy with AA supplementation is economically viable under the scenarios studied. Regardless of dietary CP level, sex was the major determinant of the economic margin-over-feed-cost, as a result of marked differences in carcass incomes.

**References**

Almeida, A.M., Alvarez-Rodriguez, J. & Latorre, M.A. (2024b). Journal of Animal Science, 102(S3), 410.

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