The effect of yeast and prebiotic supplementation on body mass and growth variability in animals across different developmental stages

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Abstract. The study investigated the impact of yeast and prebiotic supplementation on body weight and growth variability in animals over a 35 days development period. The experiment included three groups: a control group, a yeast-supplemented group, and a prebiotic-supplemented group. The body weight evolution showed that on day 7 the average body weights were 77.57 g (control), 81.57 g (yeast), and 78.5 g (prebiotic), with variation coefficients (V%) of 11.37%, 6.05%, and 8.18%, respectively. On day 14 the body weight increased to 298.93 g (control), 309.43 g (yeast), and 287.86 g (prebiotic), with V% ranging from 7.65% to 10.95%. On day 21 further increases were observed, reaching 652.06 g (control), 668.03 g (yeast), and 612.2 g (prebiotic), with a greater variability in the prebiotic group (V% =15.04%). On day 35 the final weights were 2355.23 g (control), 2393.00 g (yeast), and 2019.20 g (prebiotic), with variability between 9.04% and 11.22%. The yeast-supplemented group consistently exhibited higher weights compared to the control and prebiotic groups. Growth variability (V%) was lowest in the yeast group in most intervals, suggesting a stabilizing effect. These results highlight the potential of yeast supplementation in promoting uniform growth and higher body weight in animals, while prebiotic supplementation exhibited higher variability. The findings provide insights into optimizing nutritional strategies in animal husbandry.
Key Words: growth variability, yeast, prebiotic, performance parameters, developmental stages.

Introduction. Optimal growth and development in animals are critical for achieving high performance and efficiency in animal production systems (Chaucheyras-Durand et al 2008). Nutritional strategies, including supplementation with probiotics such as yeast and prebiotics, have been increasingly studied for their potential to enhance growth parameters, improve immune responses, and minimize variability across individuals (Dixon 1992; Czerucka et al 2007). Yeast, as a probiotic, is known for its stabilizing effects on gut microbiota and its role in improving nutrient absorption and overall growth (Chaucheyras-Durand et al 2008; Fuller 1997). Prebiotics, on the other hand, selectively stimulate beneficial bacterial growth, offering a different mechanism for promoting health and performance (Gibson & Roberfroid 1995).

Growth variability within animal populations poses significant challenges in commercial settings, impacting production consistency and profitability (Cummings & Macfarlane 1991; Györke et al 2016). Research has shown that dietary interventions can play a pivotal role in reducing variability, improving overall weight gain, and ensuring uniform performance among individuals (Fuller 1997). These interventions are particularly important during developmental stages, where animals are most responsive to nutritional inputs (Dixon 1992; Owens et al 1998).

This study aims to evaluate the effects of yeast and prebiotic supplementation on body mass and growth variability in animals across different developmental stages over a 35-days period (Czerucka et al 2007; Jenkins et al 2024). The research specifically investigates the impact of these supplements on body weight evolution, coefficient of variation (V%), and overall growth performance compared to a control group (Jenkins et al 2024). By providing insights into the relative benefits and challenges of yeast and

prebiotic supplementation, this work contributes to the optimization of dietary strategies in animal husbandry (Finegold et al 1983).

Material and Method. To evaluate the impact of yeast and prebiotic supplementation on body mass and growth variability, a 35-days experiment was conducted involving three experimental animal groups as follows:

- Control group: Animals received no nutritional supplements.
- Yeast group: Animals were supplemented with a standard dose of yeast.
- Prebiotic group: Animals were supplemented with a commercial prebiotic.

Experimental design:

- Each group consisted of an equal number of subjects, homogeneous in initial body mass and maintenance conditions.
- Animals were fed a standardized diet, with supplements administered daily in equal amounts per group.

Measurements:

- Body mass was recorded on days 7, 14, 21, 28, and 35.
- Parameters calculated included mean body mass (g) and coefficient of variation (V%) to assess growth uniformity among subjects.
- Differences between groups were analyzed statistically using significance tests to identify the effects of supplementation on growth.

Experimental conditions:

- All animals were raised in standard microclimatic conditions, with free access to water and food.
- Environmental parameters, including temperature and humidity, were monitored to ensure uniform conditions.

This rigorous methodology enabled a detailed evaluation of yeast and prebiotic effects on growth, offering relevant results for optimizing nutritional strategies in animal production.

Results and Discussion. The following information was observed between the various group correlations:
Control vs. yeast: A very strong correlation ($r=0.9999$, $p<0.00001$), indicating an extremely similar growth pattern between the control group and the yeast-supplemented group (Table 1).
Control vs. prebiotic: A very strong correlation ($r=0.9991$, $p<0.00005$), showing a similar growth pattern, although prebiotic supplementation resulted in greater variability (Wallace et al 1994).
Yeast vs. prebiotic: A very strong correlation ($r=0.9984$, $p<0.0001$), suggesting a similar impact of the supplements on body mass, with notable differences in the magnitude of their effects (Krehbiel et al 2003).

Effectiveness of yeast supplementation. The yeast-supplemented group showed the best performance in body weight, with steady and uniform growth over the 35-days period (Markowiak & Śliżewska 2017). A very strong correlation with the control group ($r=0.9999$) highlights yeast's clear impact on growth improvement while reducing variability (Fuller 1992).

Impact of prebiotic supplementation. The prebiotic group exhibited a similar growth trend to the control and yeast groups ($r=0.9991$ with control and $r=0.9984$ with yeast). However, the greater variability in final weight ($V\%=16.18$ on day 35) suggests differing individual responses, potentially due to the complex action mechanisms of prebiotics (Gaggìa et al 2010).

Performance of the control group. Although the control group showed steady growth, its final body weight was lower compared to the supplemented groups, highlighting the benefits of nutritional supplements (Györke 2013).

Table 1

Evolution of body mass and growth variability under yeast and prebiotic influence

Days		*Body mass control (g)*	*Body mass yeast (g)*	*Body mass prebiotic (g)*
	X	77.57	81.57	78.5
1-7	Sx	8.82	4.94	6.42
	V%	11.37	6.05	8.18
	X	298.93	309.43	287.86
7-14	Sx	22.88	28.14	31.53
	V%	7.65	9.09	10.95
	X	652.06	668.03	612.2
14-21	Sx	56.81	71.41	92.07
	V%	8.71	10.69	15.04
	X	1156.5	1143.6	1076.1
21-28	Sx	112.62	170.49	167.67
	V%	9.74	14.91	15.58
	X	1741.67	1767.43	1566,03
28-35	Sx	152.27	165.98	253,43
	V%	8.74	9.39	16.18
	X	2355.23	2393.00	2019.20
35	Sx	212.92	261.81	226.48
	V%	9.04	10.94	11.22

Graph of body mass evolution. The yeast-supplemented group exhibited higher and more uniform growth throughout the experiment compared to both the control group and the prebiotic-supplemented group (Markowiak & Śliżewska 2017). The prebiotic group showed the greatest variability, particularly during the later phases (days 28–35) (Buddington et al 1996). The evolution of body mass under yeast and prebiotic influence is presented in Figure 1.

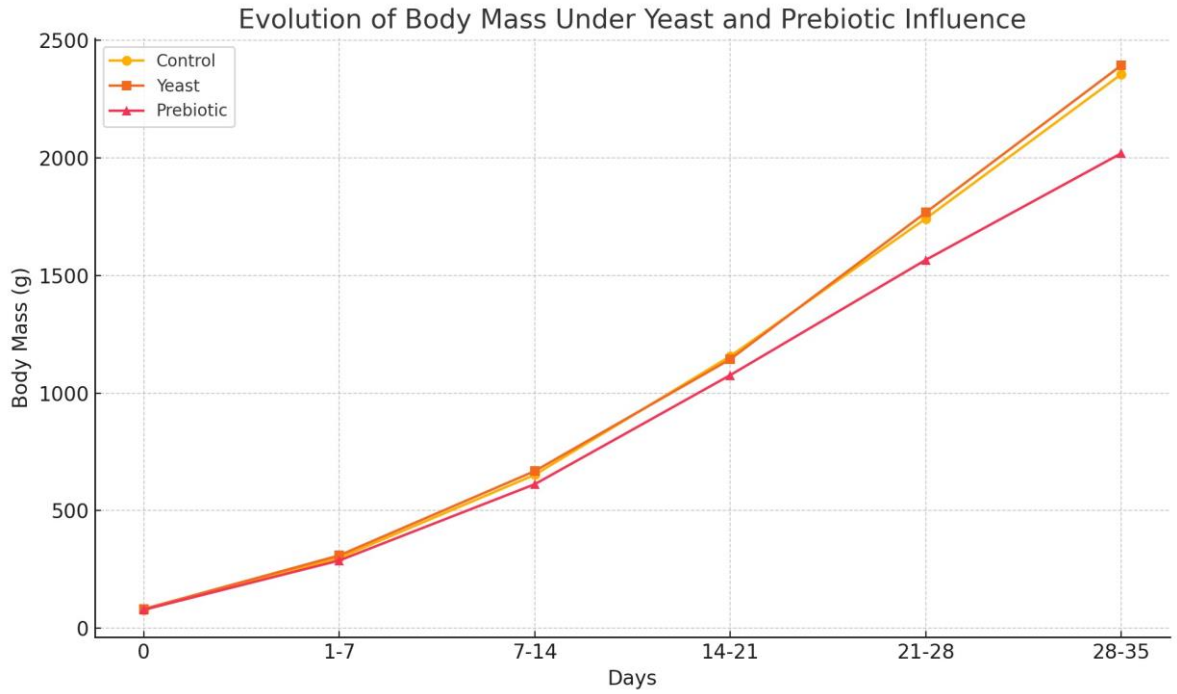

Figure 1. Evolution of body mass under yeast and prebiotic influence.

Yeast supplementation has a consistently positive effect on body weight, reducing growth variability and improving performance compared to the control group (Nehmi-Filho et al

2023). Prebiotics, although effective in increasing body weight, resulted in greater variability among subjects, possibly indicating differences in individual responses. These findings provide valuable insights for optimizing nutritional supplementation strategies.

Correlations between groups. Strong correlations across all groups suggest that nutritional supplements (yeast and prebiotic) follow similar growth patterns but differ in effectiveness and variability.

Conclusions. The study highlights the impact of yeast and prebiotic supplementation on body weight and growth variability in animals over 35 days. Yeast supplementation proved to be the most effective strategy, resulting in greater and more uniform body weight gains compared to both the control and prebiotic-supplemented groups. The prebiotic group also showed significant growth but with higher variability, suggesting differences in individual responses. Strong correlations between groups confirm similar growth patterns, but yeast supplementation demonstrated a clear advantage in reducing variability and achieving consistent performance. Prebiotics, while promising, require further optimization to minimize observed variability. These results underscore the essential role of nutritional supplements in improving animal performance, supporting more efficient production strategies, and maximizing the genetic potential of subjects. It is recommended to integrate yeast into commercial diets for uniform growth, while prebiotics can enhance general health with personalized adjustments for individual responses. This study provides a solid foundation for developing advanced nutritional practices in animal husbandry. Yeast supplementation is recommended for achieving uniform and rapid growth, making it ideal for production systems focused on consistent performance. Prebiotics can be used to optimize general health but require careful calibration to reduce individual variability.

Conflict of interest. The authors declare no conflict of interest.

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