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Effect of prebiotic supplementation on productive traits, carcass characteristics, and meat quality in growing broiler during the starter period-

Ameni ASKRI*[1], Aziza RAACH-MOUJAHED[2], Naceur M'HAMDI[2], Zied MAALAOUI[3], Hajer DEBBABI[4]

[1]Research Unit of biodiversity and resource development in mountain areas of Tunisia, UR17AGR14, Higher School of Agriculture of Mateur, University of Carthage, Tunisia*
[2]Research Laboratory of Ecosystems & Aquatic Resources, UR03AGRO; National Agronomic Institute of Tunisia, University of Carthage, 43 Av. Charles Nicolle, Tunis 1082.
[3]Arm & Hammer Animal Nutrition, North Africa, Tunis, Tunisie, Tunis 1002
[4]Department of Agrifood industries, UR17GR01 PATIO; National Agronomic Institute of Tunisia, University of Carthage, 43 Av. Charles Nicolle, Tunis 1082.

***Corresponding author:** Ameni Askri. Tunisia. E-mail: askria.ing@gmail.com

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Abstract

This study aimed to investigate the effect of the inclusion of *Saccharomyces cerevisiae*-derived prebiotic, on broiler's diets as a potential substitute for antibiotics growth promoters (AGPs) in poultry production, on performance, carcass characteristics, and meat quality of broiler chickens. For a total of 224 (-1 days old) Arbor Acres chickens of either sex were randomly assigned to four dietary treatments each consisting of seven replicates and each replicates having 8 birds/ cage. The experiment duration was 42 days. The dietary treatments were (P0) The birds were fed a basal diet without prebiotic, (P1) basal diet with 1g of prebiotic, (P2) basal diet with 1.5g of prebiotic, and (P3) basal diet with 2g of prebiotic. Average weight (AW), Daily Weight Gain (DWG), FI (Feed Intake), Feed Conversion Ratio (FCR), Mortality Rate (MR), hot and cold carcass weight, yield, and muscle weights were measured. Meat quality was evaluated by determining the pH and color values of the CIE Lab Color System. A sensory analysis was performed. Results showed no significant difference in growth performance (P>0.05). Indeed, the control group had a significantly higher BW compared with experimental treatments P1, P2, and P3. Furthermore, broiler DWG did not differ (P>0.05) between the control and the experimental groups. Likewise, no significant differences were observed between treatments regarding FI, FCR, and mortality (P>0.05). The overall mortality rate during the experimental period was low in the control group (0%) compared to the group fed prebiotic (0.2%). No significant effect was observed regarding pH 30 min and ultimate pH (P>0.05). However, a significant difference has occurred in the meat color (P= 0.03). Therefore, meat quality showed no alteration when prebiotic was added during the starter period. It was concluded that the *Saccharomyces cerevisiae*-derived prebiotic added to the broiler diet at doses up to 2g/kg during the starter period did not improve performance, but could maintain meat quality. Further investigations are needed to clarify the effect of duration prebiotics administration on meat quality in broiler chickens.

Keywords: prebiotic, productive traits, organoleptic characteristics, broiler, starter period, Arbor Acres..

الملخص

هدفت هذه الدراسة إلى التحقق من تأثير إدراج البريبايوتك المشتق من ساكاروميسيس سيريفيزيا ، على وجبات الدجاج اللاحم كبديل محتمل لمحفزات نمو المضادات الحيوية (AGPs) في إنتاج الدواجن ، على الأداء ، وخصائص الذبيحة ، وجودة لحوم الدجاج اللاحم. مجموعه 224 دجاجة (بعمر -1 يوم) تم توزيعها بشكل عشوائي على أربعة معالجات غذائية تتكون كل منها من سبع مكررات ولكل منها 8 طيور / قفص. كانت مدة التجربة 42 يومًا. كانت معاملات الغذاء (P0) تغذية الطيور على العلف الأساسي بدون البريبايوتك ، (P1) على النظام الغذائي الأساسي مع 1 جم من البريبايوتك ، (P2) على النظام الغذائي الأساسي مع 1.5 جم من البريبايوتك ، و (P3) على العليقة القاعدية مع 2 جم من البريبايوتك. تم قياس متوسط الوزن (AW) ، وزيادة الوزن اليومية (DWG) ، و FI (الغذاء المدخول) ، ونسبة تحويل العلف (FCR) ، ومعدل الوفيات (MR) ، ووزن الذبيحة الساخنة والباردة ، والمحصول ، وأوزان العضلات. تم تقييم جودة اللحوم من خلال تحديد قيم الأس الهيدروجيني واللون لنظام ألوان مختبر CIE. تم إجراء تحليل حسي. أظهرت النتائج عدم وجود فرق معنوي في أداء النمو (P> 0.05). في الواقع ، كان لدى المجموعة الضابطة BW أعلى بشكل ملحوظ مقارنة بالمعالجات التجريبية P1 و P2 و P3. علاوة على ذلك ، فإن دجاج التسمين DWG لم يختلف (P> 0.05) بين المجموعة الضابطة والمجموعات التجريبية. وبالمثل ، لم تُلاحظ فروق ذات دلالة إحصائية بين المعالجات فيما يتعلق بالفرز السلسلي ، والتحول الغذائي ، والوفيات (P> 0.05). كان معدل الوفيات الإجمالي خلال فترة التجربة منخفضًا في المجموعة الضابطة (0٪) مقارنة

بالمجموعة التي تتغذى على البريبايوتك (0.2٪). لم يلاحظ أي تأثير معنوي فيما يتعلق بالرقم الهيدروجيني 30 دقيقة ودرجة الحموضة النهائية (P> 0.05). ومع ذلك ، حدث اختلاف كبير في لون اللحم (P = 0.03). لذلك ، لم تظهر جودة اللحوم أي تغيير عند إضافة البريبايوتك خلال فترة البداية. استنتج أن البريبايوتك المشتق من ساكاروميسيس سيريفيزيا المضاف إلى علف دجاج التسمين بجرعات تصل إلى 2 جم / كجم خلال فترة البداية لم يحسن الأداء ، ولكن يمكن أن يحافظ على جودة اللحوم. هناك حاجة إلى مزيد من التحقيقات لتوضيح تأثير مدة إدارة البريبايوتكس على جودة اللحوم في دجاج التسمين.

الكلمات المفتاحية :البريبايوتك ، الصفات الإنتاجية ، الخصائص الحسية ، دجاج التسمين ، فترة البداية ، فدان أربور

Introduction

For many decades, the poultry industry has been looking for improvement in the health and performance of birds with the inclusion of sub-therapeutic levels of antibiotics in diets (Das et al., 2012; Ganguly, 2013). However, human health has been threatened due to the development of antimicrobial resistance and contamination of poultry products with antibiotic residues (Furtula et al., 2013; Prestinaci et al., 2015). Hence, the use of antibiotics as growth promoting agents (AGPs) was banned by the European Union in 2006 (EC Regulation No. 1831/2003). Supplementing the diet with AGPs could promote the growth performance of animals through various mechanisms: (a) the nutrients are more efficiently absorbed and less is utilized by the gut, (b) more nutrients are available to the host, (c) there is a reduction in harmful gut bacteria, (d) production of growth suppressing toxins or metabolites is reduced, (e) microbial de-conjugation of bile acids is decreased (Ohimain and Ofongo, 2012). Researchers looked for potential alternatives to AGPs in order to maintain efficient poultry production (Gadde et al., 2017). Prebiotics has been defined as non-digestible substances that beneficially affect the host by selectively altering the composition and metabolism of the gut microbiota (Das et al., 2012). They have been proposed as a potential substitute to improve growth performance, modulate the intestinal microbiota by providing energy for endogenous favorable bacteria in the gut such as *Lactobacillus* and *Bifidobacterium*, and reduce the intestinal colonization gut of detrimental bacteria such as *Escherichia coli* (Pourabedin et al., 2015; Sarangi et al., 2016; Askri et al., 2018). Many researches were interested on the use of prebiotics as a feed additives in poultry and confirmed their beneficial effects on the microbiota composition, intestinal morphology, and productive parameters (Lu et al., 2012; Li et al., 2016; Slawinska et al., 2019). A preliminary study conducted by Askri et al. (2018) indicated that the prebiotic administration could enhance growth performances, but has altered meat sensory quality. The main aim of this research was to investigate the effect of *Saccharomyces cerevisiae*-derived prebiotic supplementation on the performance, carcass characteristics, and meat quality of broiler chickens.

Materials and methods

Ethical approval

The experiment was carried out according to the National Regulations on Animal Welfare and Institutional Animal Ethics Committee.

Birds and diets

A total of 224 (-1day old) Arbor Acres chickens with an initial average weight of 45.82±3.13 g were randomly assigned to four groups of 56 chickens during the 42 days of the experimental period. The chicks were winged banded, weighed, and randomly distributed into four dietary treatment groups. Each group was again divided into seven replicates having 8 chicks in each replicate pen.   The dietary treatments were (P0) control, (P1) basal diet supplemented with prebiotic *Saccharomyces cerevisiae* (1 g/ kg of starter diet), (P2) basal diet supplemented with prebiotic (1.5 g/ Kg of starter diet, and (P3) basal diet supplemented with prebiotic (2 g/kg of starter diet). The details of the used diet have been presented in table 1. The chicks were fed with a starter ration for up to 14 days and a finisher ration from 15 to 42 days of age. The birds were provided with a starter diet with 2900 kcal of metabolizable energy [ME]/kg of ration and 20.5% crude protein [CP]) from 0 to 14 days of age (Table 1).

Housing and management

The experiment was carried out in the poultry experimental unit of the National Agronomic Institute of Tunisia. Minimum and maximum temperatures during the experimental period were 14 and 21^{o} C, respectively. Chickens were vaccinated against Gumboro, Infectious Bronchitis (IB), and Newcastle Disease (ND). All birds received starter feed from 1 to 14 d and grower-finisher feed from 15 to 42 d, respectively. Feed and water were provided *ad libitum* throughout the experimental trial. The feeders and waterers were adjusted, according to the progressive growth of the chicks. During the first week, the temperature was fixed at 35°C and then was gradually reduced to 24°C until the end of the experiment and continuous light was provided 24h/d by the use of fluorescent lights.

Measurement

The average weight (AW), feed intake (FI), daily weight gain (DWG), and feed conversion ratio (FCR) were determined for each group. The average weight and feed intake were measured weekly. Daily weight gain is calculated as the difference between the final and initial body weights. Feed intake was calculated as the difference between the amount of feed supplied to the birds and the amount of feed refused. The feed conversion ratio was calculated as the ratio of feed intake to body weight gain. Mortality was recorded daily. At the end of the trial, birds had fasted for 12h with only water allowed. Birds were individually weighed and manually slaughtered. All eviscerated carcasses were refrigerated at 4°C for 24 h and weighed individually to calculate the eviscerated carcass yield (CY). After cutting, chicken muscles (breast and thigh) were also weighed.

Table 1: The ingredients and nutrient levels of the basal diet

Ingredients (%)	Starter (d1-14)	Grower-Finisher (d15-42)
Corn	64	69
Soybean meal	32	27
Mineral[1] and vitamin[2] mixture	4	4
Anticoccidial	No	No
Total	100	100
	Calculated nutrient Content	
ME[3] (Kcal/Kg)	2900	2970
Crude Protein %	20.5	19.5
Crude fiber %	3	3
Ash %	6.5	6.5
Fat %	3	4
Calcium %	1	0.9
Available Phosphorus %	0.67	0.66
Methionine %	0.5	0.44
Threonine %	0.8	0.78
Tryptophan %	0.3	0.25

[3]*kcal of metabolizable energy [ME]/kg of ratio*

Meat quality

The physical analysis was carried out as follows: The pH was determined in the breast muscle at 2 cm depth using a calibrated pH meter (Hanna HI- 99163) as described in Olivo et al., (2001). The color was measured at 24 h *postmortem* using a Minolta Chromameter (CR410 Konica Minolta Sensing Inc., Osaka, Japan). (L), (a) and (b) measures determined, where (L) measures lightness, (a) measures redness and (b) measures yellowness. The sensory analysis was determined by scale based on a 9-points scale (Meilgaard et al., 2014), each panelist was asked to evaluate cooked breast samples for color, aroma, flavor, tenderness, juiciness, overall appreciation.

Statistical analysis

All statistical analyses were performed using the statistical software package SAS version 9.4 (Statistical Analysis System, Release 9.4 2012; SAS Institute Inc., Cary, NC, USA). Data were checked for normality (Kolmogorov–Smirnov test) and homogeneous variance (Levene's test). The influence of prebiotics was evaluated using the one-way ANOVA test. When the ANOVA shows significant differences, the Dunnet test was applied to compare the mean of each treatment to the control. The data were expressed as a mean ± standard error. Differences at the 5% significance level were considered significant.

Results and discussion

Effect of prebiotic supplementation on productive traits

The mean values of BW, FI, FCR, and mortality rates are presented in Table 2. Results showed that the control group had a significantly (P= 0.042) higher BW (1927g) compared with experimental treatments P1 (1862 g), P2 (1832 g), and P3 (1803 g). Furthermore, broiler DWG did not differ (P>0.05) between the control and the experimental groups. Likewise, no significant differences were observed between treatments regarding FI, FCR, and mortality (P>0.05) which were generally low and averaged 0 and 0.5% for the whole experiment. The overall mortality rate during the experimental period was low in the control group (0%) compared to the prebiotic group (0.2%). The mortality observed in the present study was lower than (the 3%) reported by Awad *et al.*, (2009) in Ross 308 commercial broilers. Our results showed that the incorporation of an increasing level of prebiotic during the starter period had not been any significant improvement in growth performance. In agreement with our results, Rehman et al. (2008) observed that the supplementation of a prebiotic at a 1g/ kg diet did affect the final BW of broilers. Likewise, Alzueta et al. (2010) showed that the inulin addition (from 5 to 20 g/kg) to a maize-soybean meal-based diet did not improve the growth performance of broiler chickens.

Table 2. Effect of prebiotic supplementation during the starter period on productive traits

	Dietary groups				Level of significance		
	P0 (Control)	**P1 1(g/kg)**	**P2 (1.5g/kg)**	**P3 (2g/kg)**	***P0P1***	***P0P2***	***P0P3***
AW (g)	1927.81±235	1862.08±71	1832.25±210	1803.41±246	0.88	0.72	0.55
DWG (g/b/d)	44.83±43	43.21±41	42.53±41	41.85±40	0.89	0.88	0.56
FI (g/b)	78.86±9	83.17±12	74.21±8	80.38±13	0.62	0.57	0.96
FCR (g/g)	1.73±0.2	1.85±0.2	1.68±0.3	1.89±0.3	0.54	0.93	0.31
Mortality rate (%)	0	0	0	0.59±1.5	1.00	1.00	0.41

Other studies demonstrated that prebiotic supplementation in the broiler diet had no significant difference in growth performance (Li et al., 2017; Zhou et al., 2019). As well, Waqas et al. (2018) affirmed that the dietary prebiotic supplementation did not exert (P>0.05) body weight and body gain. Nevertheless, other researchers reported that supplementation of prebiotics had significantly improved productive traits (Munyaka et al., 2012; Bednarczyk et al., 2016; Adhikari and Kim 2017). Equally, Mateova (2008) stated a significant improvement in body weight significantly with prebiotic inclusion in the broiler diet. Besides, Toghyani et al. (2011) found that adding 1 mg/kg of mannan oligosaccharide (MOS) in broiler chicks' diets results in significantly (P<0.05) higher feed intake and body weight over 14-28 d. Moreover, Utami and Wahyono (2018) who showed that prebiotic supplementation in laying hens' diet increased feed consumption. The feed conversion ratio describes the relationship between feed intake and body weight gain. More precisely, it is the animal's overall efficiency in converting feed mass into body mass over a specific period. Konca et al. (2009) found that 1 mg/kg mannan oligosaccharide added to the turkey diet, increased significantly feed intake, and feed conversion ratio (P<0.05) from 10 to 20 weeks of age. Similarly, Sohail et al. (2012) confirmed that adding MOS to broiler chicks' diet had given a higher (P<0.05) body gain (754.6 ± 26.35 g), feed intake (990.6 ± 31.55 g), and better feed conversion ratio (1.31± 0.04) compared with the control group. Remarkably, our results showed that prebiotics should be present in the broiler diet during the whole period to promote growth performance. This result could be explained by the fact that the length of time for adaptation and the exposure of gastro-intestinal tract (GIT) microbes to the supplemented prebiotic plays an inevitable role in enhancing growth performance. Harmoniously, Hanning et al., (2012) found a better result with villi height and crypt depth of intestine when FOS was added for a longer duration.

Effect of prebiotic supplementation on carcass characteristics

The effect of prebiotic supplementation on carcass characteristics is shown in Table 3. The hot carcass yields ranged, respectively, from 74 for P3 to 74.25% for the control group which was in the line with results of Sarangi et al. (2016) who reported a carcass yield in the range from 73.77 to 76.04% at 42 days of age. Our results are higher than those of, Abdel-Raheem and Abd-Allah (2011) who reported

64.45 to 70.68% in Cobb Avian 48 broilers. No significant differences were observed for carcass yields, breast muscle, and thigh weights (P>0.05). The present findings were in agreement with the report of Sahin et al. (2008) and Chumpawadee et al. (2008) who demonstrated that the prebiotic had no significant (P>0.05) effect on carcass yields of quails and broilers. These results were not in agreement with the findings of Abdel-Raheem and Abd-Allah (2011) who noticed a significant increase (P<0.05) in the carcass weight. So, Maiorano and Bednarzyck (2016) showed that *in ovo* prebiotic injection into the chicken embryo did not affect carcass and yield. Corroborating with our results on growth performance, the prebiotic incorporation in the broiler diet during the starter period did not significantly improve carcass characteristics. The findings of the current study are in line with previous studies (Abu Shulukh et al., 2017) which not indicate a significant effect on carcass parameters when prebiotics was added to broiler diet. In another report, Wang et al. (2015) cited that prebiotic supplementation did not significantly affect breast as well as thigh weight.

Table 3. Effect of prebiotic supplementation during the starter period on carcass characteristics

	Dietary groups				**Level of significance**		
	P0 (Control)	**P1 1(g/kg)**	**P2 (1.5g/kg)**	**P3 (2g/kg)**	***P0P1***	***P0P1***	***P0P3***
Hot Carcass weight (g)	1598.53±144	1602.60±196	1573.90±269	1539.80±236	1.00	0.98	0.40
Hot Carcass Yield (%)	74.25±3.36	74.31±3.60	74.83±2.53	74.45±4.10	1.00	0.99	0.58
Cold carcass weight (g)	1542.17±143	1517.84±209	1503.15±255	1497.05±243	0.97	0.91	0.87
Cold carcass Yield (%)	71.63±3.49	70.31±4.76	71.50±2.94	72.31±4.23	0.64	0.99	0.91
Thigh weight (g)	440.57±69.87	470.12±61.80	446.50±77.36	454.53±73.72	0.46	0.98	0.87
Breast weight (g)	502.60±48.65	516.86±75.50	516.83±86.51	508.71±81.51	0.89	0.89	0.98

Effect of prebiotic supplementation on meat quality

The pH post-mortem values of different groups are shown in Table 4. The pH value reached at 30 mn of the breast muscle was not significantly different (P > 0.05) between the control group (5.8 ± 0.11) and experimental ones (P1= 5.8±0.13; P2=5.9±0.17, and P3=5.8±0.17). Consequently, the prebiotic supplementation had no significant effect on pH value after 24 hours (P>0.05). It could be concluded that the incorporation of increasing levels of prebiotics in the broiler diet during the starter period could not affect the meat pH (P>0.05). Otherwise, Park and Park (2011) reported a significant decrease in meat pH by inulin-prebiotic inclusion. Additionally, in the study of Juśkiewicz et al. (2006) carried on turkeys for 8 weeks, a reduction of the intestinal pH was noted in the case of FOS administration at the concentration of 2%. On the same hand, Ziggers (2000) affirmed that prebiotic supplementation on the broiler diet results in a reduction of gastrointestinal pH. On the other hand, Cheng et al. (2017) showed that dietary supplementation with synbiotics increased significantly the pH 24h of breast muscle in Arbor Acres Plus. Our results suggested that this supplementation did not eventually modulate the level of muscle energy reserves.

Table 4. Effect of prebiotic supplementation during the starter period on pH post mortem

	Dietary groups				**Level of significance**		
	P0 (Control)	**P1 1(g/kg)**	**P2 (1.5g/kg)**	**P3 (2g/kg)**	**P0P1**	**P0P2**	**P0P3**
pH 30 min	5.80±0.11	5.80±0.13	5.90±0.17	5.83±0.17	1.00	0.19	0.89
pH 2 h	5.86±0.45	5.71±0,21	5.73±0.13	5.77±0.18	*0.23*	*0.36*	*0.66*
pH 6 h	5.81±0.24	5.70±0.11	5.71±0.15	5.69±0.13	*0.11*	*0.11*	*0.13*
ultimate pH	5.55±0.09	5.60±0.08	5.55±0.08	5.56±0.10	0.40	1.00	0.99

According to table 5, the lightness (L) value of breast from group P3 (57.13±7) was significantly (P<0.001) lower in comparison with the control group (61.91±2) and there was no significant difference between the Lightness value of breast from the control group and other treated groups (P1=60.48±2; P2=60.37±3). The thigh lightness (L) value was not significantly (P= 0.07) different among treatments. Likewise, for the redness (a), no significant difference (P > 0.05) has occurred in the breast and thigh between the control and experimental groups. Regarding yellowness value (b), breast from the control group was more yellow (14.74) than breast from the experimental groups (P1=12.87; P2=12.29; P3=12.42) but the significant difference (P= 0.002) has been registered only between the control group (13.03±1) and P2 (11.49±2) and control group and P3 (12.57±1). Hence, the yellowness thigh value of the control group was significantly (P=0.03) higher compared to group P2 (59.29±3 vs 57.69±3). Our results revealed that the incorporation of increasing levels of prebiotics during the starter period could affect meat color. Our findings are in line with those of Pelicano et al. (2013) who reported that the lightness was affected by probiotics supplementation in both water and diet. Cho et al. (2013) showed greater breast meat redness in broilers receiving prebiotic diets, but no significant effect was observed for Lightness and yellowness (P > 0.05). However, Zhao et al. (2013) indicated no significant effect of prebiotic supplementation on breast color. Furthermore, Pelicano et al. (2005) proved that adding prebiotics to the broiler diet did not affect meat color.

Table 5. Effect of prebiotic supplementation during the starter period on meat color

		Dietary groups				**Level of significance**		
		P0 (Control)	**P1 1(g/kg)**	**P2(1.5g/kg)**	**P3 (2g/kg)**	**P0P1**	**P0P2**	**P0P3**
Breast	***L***	61.90±2.67	60.48±2.56	60.37±3.94	57.13*±7.78	0.72	0.67	0.01
	a	6.74±1	7.09±0.90	7.05±1.29	7.55±1.37	0.72	0.76	0.06
	b	14.74±1.95	12.87±1.93	12.29*±3.42	12.42*±2.03	0.07	0.01	0.02
Thigh	***L***	59.29±3.20	59.03±3.44	57.69±3.53	58.87±2.81	0.99	0.34	0.93
	a	8.90±1.25	8.47±1.30	9.42±1.81	8.77±1.14	0.71	0.55	0.9
	b	13.03±1.24	12.09±1.70	11.49*±2.52	12.57±1.41	0.3	0.03	0.79

The results of the sensory analysis were shown in Table 6.

Table 6. Effect of prebiotic supplementation during the starter period on meat sensory analysis

	Dietary groups				**Level of significance**		
	P0 (Control)	**P1 1(g/kg)**	**P2 (1.5g/kg)**	**P3 (2g/kg)**	**P0P1**	**P0P2**	**P0P3**
Odour	4.00±2,30	*4,16±1,72*	2,85±*2.26*	2,14±2.34	*0.99*	*0.65*	*0.28*
Colour	2,85±2.62	3,16±1,32	4,14±*2.26*	3,14±2.41	*0.98*	*0.55*	*0.98*
Tenderness	3,14±*2.03*	*5,33±2,42*	4,42±*3.40*	3,57±2.25	*0.31*	*0.68*	*0.98*
Juiceness	3,14±*1.34*	1,83±1,47	3,71±*3.03*	4,85±3.33	*0.67*	*0.95*	*0.45*
Taste	3.00±*1.00*	3,66±1,03	3,85±*1.34*	4,14±2.34	*0.78*	*0.61*	*0.39*
Flavor	3,57±*2.50*	3,66±1,63	3,85±*1.57*	3,85±1.67	*0.99*	*0.98*	*0.98*
Global acceptance	4,42±*1.39*	3,83±1,47	5,57±*2.87*	4,71±2.21	*0.92*	*0.62*	*0.98*

Results revealed that the aroma of control samples was more intense but not significantly different in comparison with experimental groups, particularly in samples from groups P2 and P3. Regarding color, no significant difference was observed between the control and experimental samples ((P0P1=0.98; P0P2=0.55; P0P3=0.98). While samples from experimental groups were darker than control sample's confirming the results of instrumental measurement CIE Lab particularly for group P2. As well, the group that received a higher dose of prebiotic had more juicer meat than the control group. Moreover, control samples were perceived as tougher and less tasty compared to prebiotic samples, it was, therefore, the least appreciated by the panel. In terms of flavor, no notable difference was recorded between control and prebiotic samples. Altogether, meat from group P2 was the most appreciated in comparison with meat from other groups and this may account for the fact that prebiotic based on *Saccharomyces cerevisiae* could edit the profile of fatty acids in muscle. The results of the current study are in line with the study of Saleh et al. (2013) that investigated the effect of prebiotics on the meat quality of broilers chickens.

Conclusion

The findings of this study showed that supplementation of increasing levels of *Saccharomyces cerevisiae* derived prebiotic during the starter period did not improve significantly growth performance but allowed to improve meat quality. Interestingly, this prebiotic should be present in the broiler diet during the whole period for optimum growth performance but it should be removed one week before slaughter to avoid alteration of sensory quality. This study has highlighted that the duration of prebiotic incorporation is an influencing factor that must be considered in the poultry industry. Further studies are needed to understand the extent of this contribution, and in particular to assess the effect of duration prebiotics inclusion on meat quality characteristics.

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