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Effect of grape pomace supplementation on broiler performance and eating quality

Sossidou, E.N., Kasapidou, E., Dotas, V., Ioannidis, I. and Mitlianga, P.

HELLENIC AGRICULTURAL ORGANIZATION - DEMETER
DIRECTORATE GENERAL OF AGRICULTURAL RESEARCH
N.AG.RE.F.

Veterinary Research Institute, GREECE

sossidou.arig@nagref.gr

Background

Modern consumers have an increased interest in natural and "clean label" products.

Consumers prefer to read for example "rosemary extract" not "butulated hydroxytoluene"

(Zink, 1997;Joppen, 2006)

They are willing to pay significant premiums for such products.

Background

Lately, environmental consciousness has laid great social and political pressure for the re-utilisation of the agro-industrial co- and by products (Mirzaei-Aghsaghali and Maheri-Sis, 2008).

Fruit and plant co-/by- products that have a little effect in animal feeding as major feed components, have potential as functional feed ingredients. They are good sources of natural antioxidants due to their high phenolic content (Rice-Evans *et al.*, 1997; Schieber *et al*., 2001).

Grape pomace

The by-product after grape pressing and wine/grape juice collection that contains grape seeds, skins, and/or stems.

Wine waste accounts for approximately 20% of wine production (Maier *et al*., 2009). Global production of grape pomace is 10 million tons (Negro *et al.*, 2003).

Grape pomace: Properties

Properties of phenolic compounds (Negro *et al.*, 2003).

- ❑ Anti-inflammatory
- ❑ Anticarcinogenic
- ❑ Antioxidant

Principal phenolic compounds with demonstrated antioxidant activity (Makris et al., 2007): Anthocyanins, Flavanols, Proanthocyanidins, Hydroxycinnamates, Gallic acid.

Literature

Grape pomace concentrate could be a new source of antioxidant in animal nutrition –as equal in antioxidant potential as vitamin E (Brenes *et al*., 2008).

A dietary inclusion rate up to 30 g/kg of grape pomace did not impair chickens growth performance and protein and amino acids digestibilities and increased antioxidant activity in diet and excreta (CÒni *et al.*, 2007)

Literature

Pre-mortem addition of grape seed extract in broiler diets resulted in growth retardation (Lau and King, 2003).

Post–mortem inclusion of grape seed extract resulted in colour differences in cooked meat products (Lau and King, 2003; Carpenter *et al*., 2007; Ahn *et al*., 2007; Brannan, 2008)

Redder products may appear undercooked.

Objectives

To determine the effect of ground and dried grape pomace (simple processing procedure) inclusion on:

- Broiler performance
- Meat eating quality

The production of broiler meat with extended shelf life

Materials and methods (I)

- Four groups (4 replicates/group) of day old, mixed sex, Ross 308 chicks;
- Standard commercial diet containing either either 0 (CON), 2.5 (DGP 2.5), 5 (DGP 5)or 10 g/kg (DGP 10) feed ground and dried grape pomace for 42 days;
- Grape pomace consisted of peels, seeds and a small amount of stems from the Greek indigenous red grape variety ***Xinomavro***;

Materials and methods (II)

- Bird performance



Materials and methods (III)

- Refrigerated (4°C) air packed skinless breast (m. *pectoralis superficialis*) and thigh muscle (m. *biceps femoris*) samples for:

  Lipid oxidation (TBARS) storage days 2 and 5

- Refrigerated (4°C) air packed skinless breast (m. *pectoralis superficialis*) for:

  Colour evaluation (CIELAB system) storage days 1-5

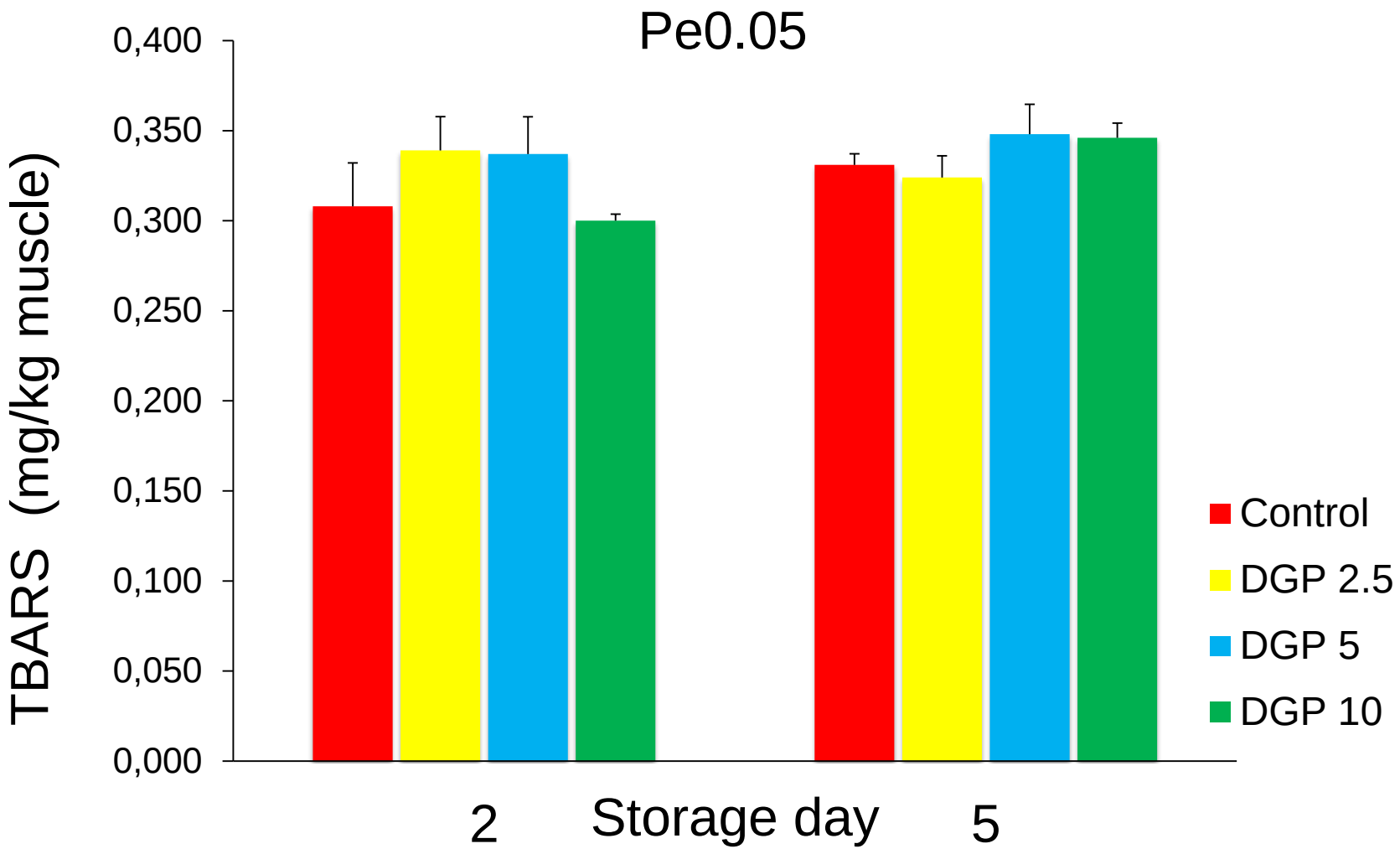
- Vacuum packed frozen (-20°C) skinless breast samples for:

  Sensory evaluation in 5 point scale by 10 panelists

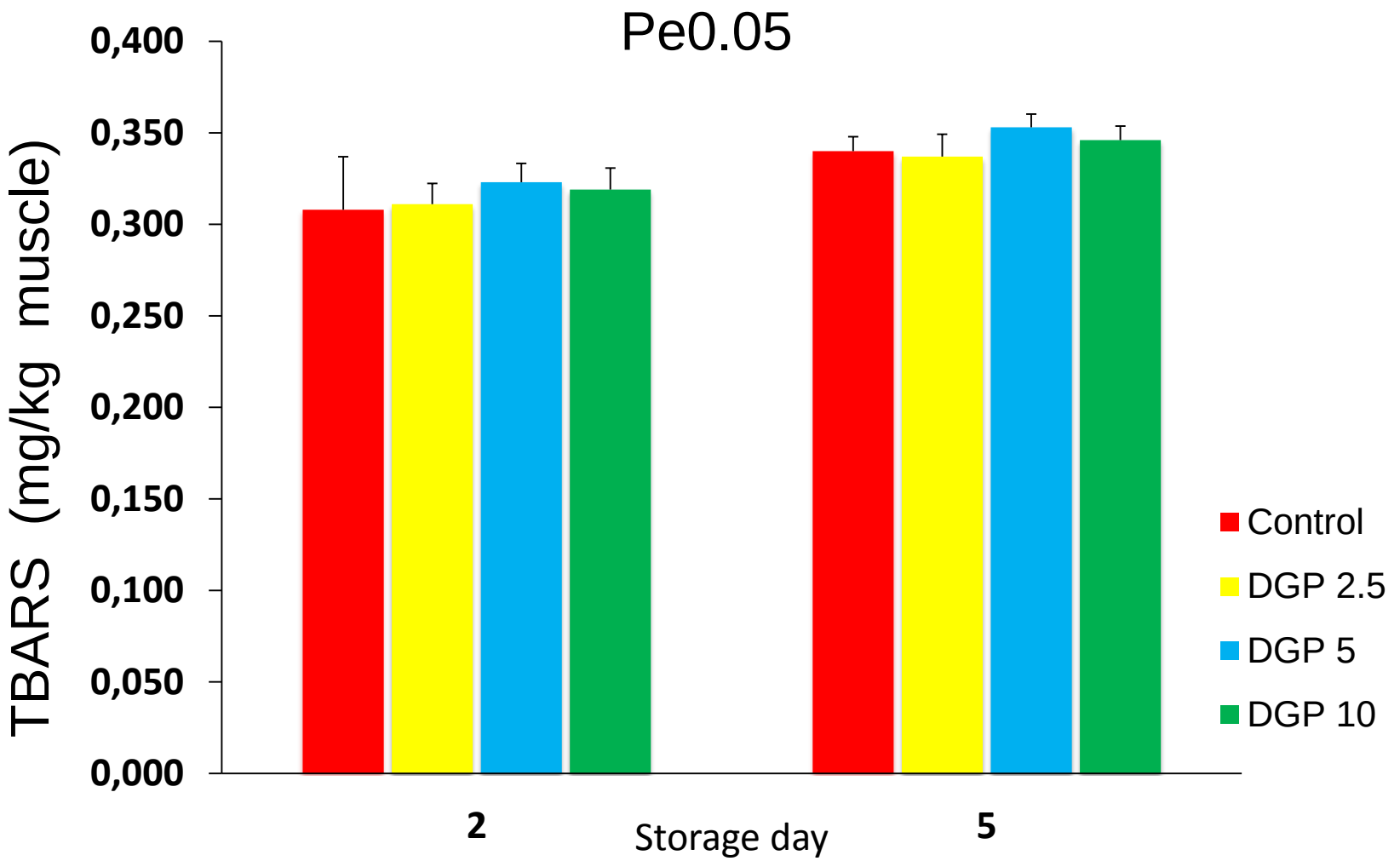
Results (I): Bird performance

Treatment	Daily weight gain	Weight 42 days	Carcass weight
CON	71,42±0,85	2484,55±25,55	1884,44±58,12
DGP 2,5	67,32±0,84	2358,17±25,52[a]	1835,56±62,36[a]
DGP 5	70,56±0,95	2458,61±28,65[b]	1953,08±61,93[b]
DGP 10	72,97±0,85	2535,13±25,92[c]	1950,00±59,43[b]

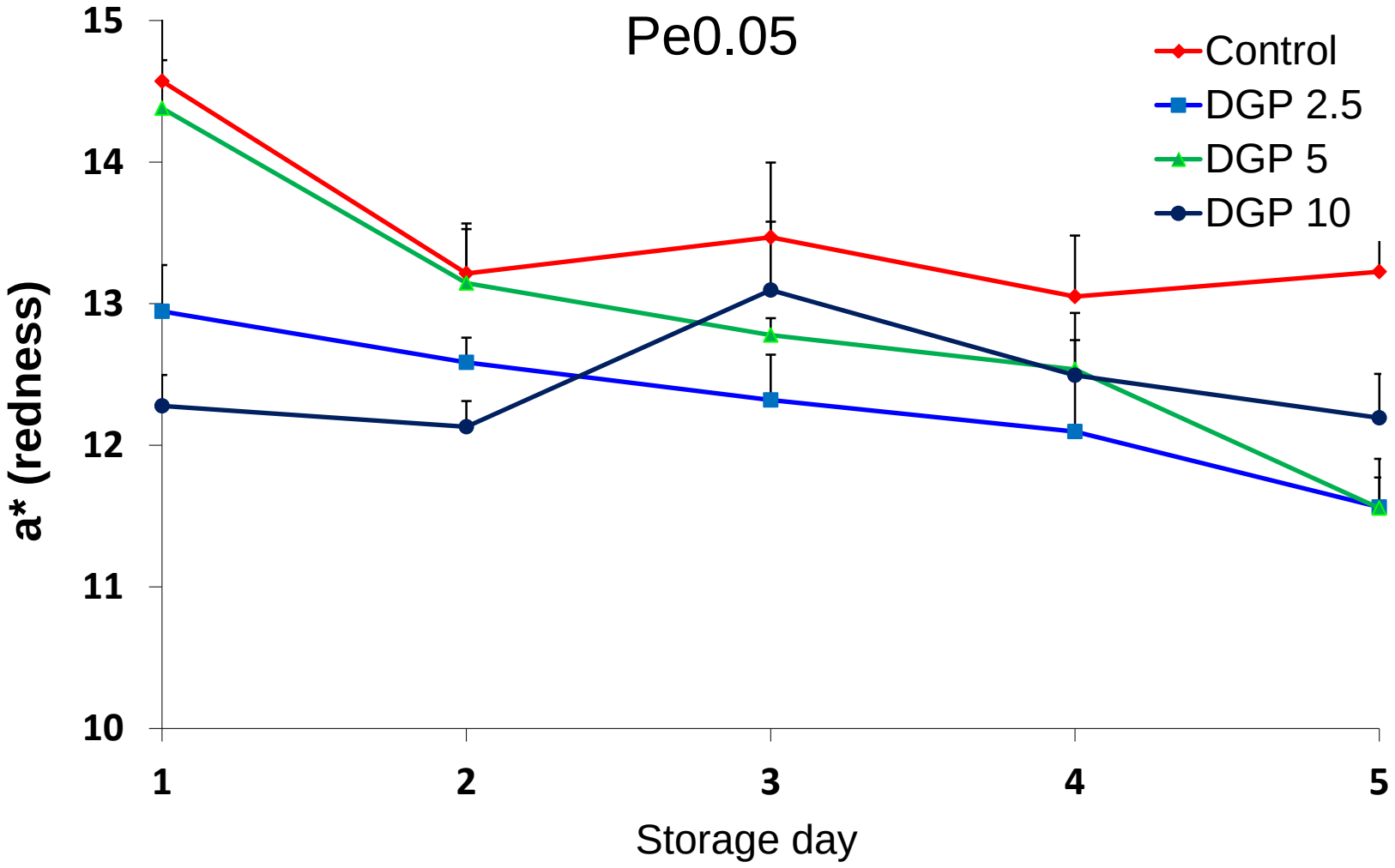
Results (II)
Breast muscle lipid oxidation levels during storage at 4°C



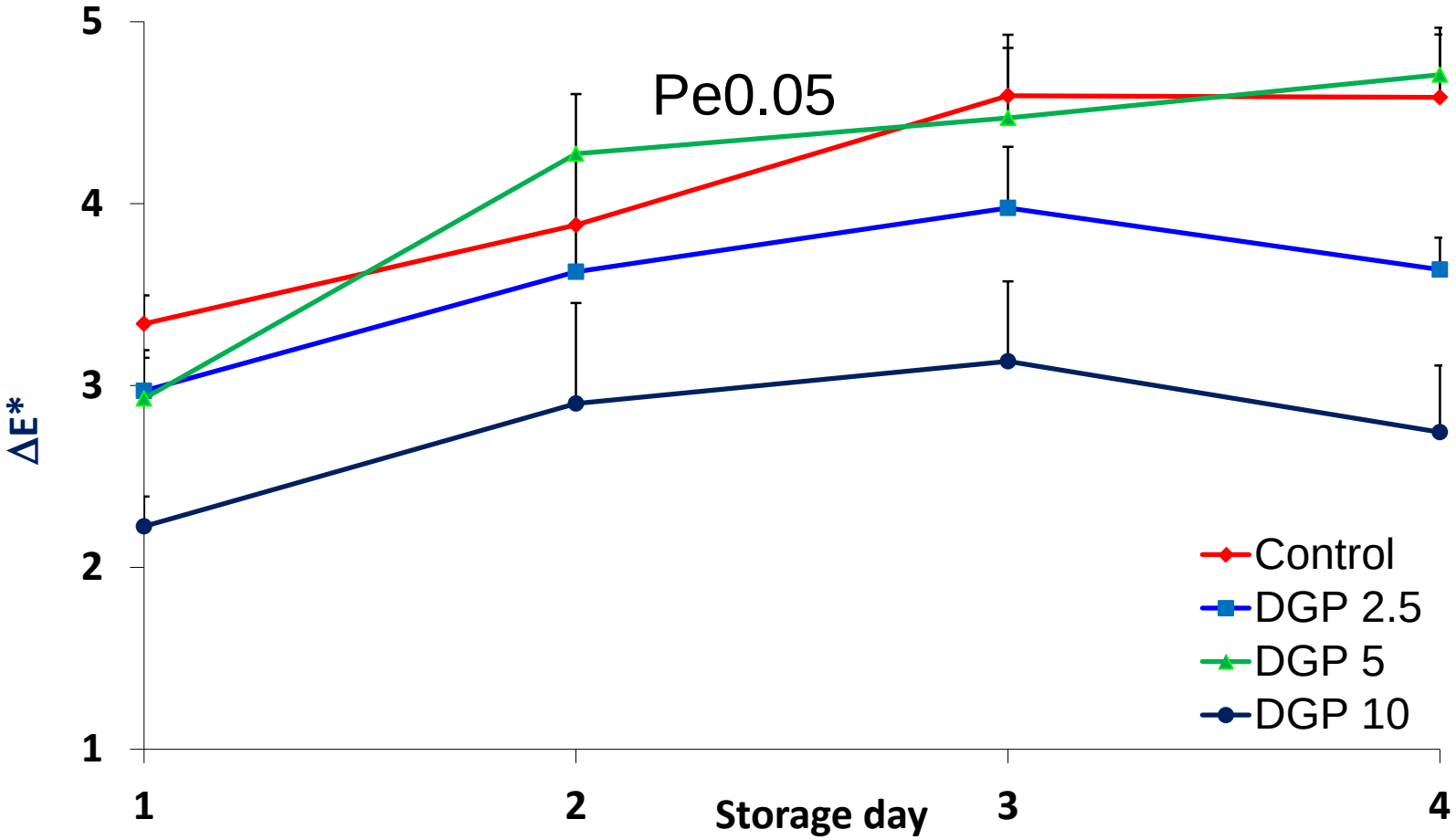
Results (III)
Thigh muscle lipid oxidation levels during storage at 4°C



Results (IV)
Breast colour redness (a*) during storage at 4°C

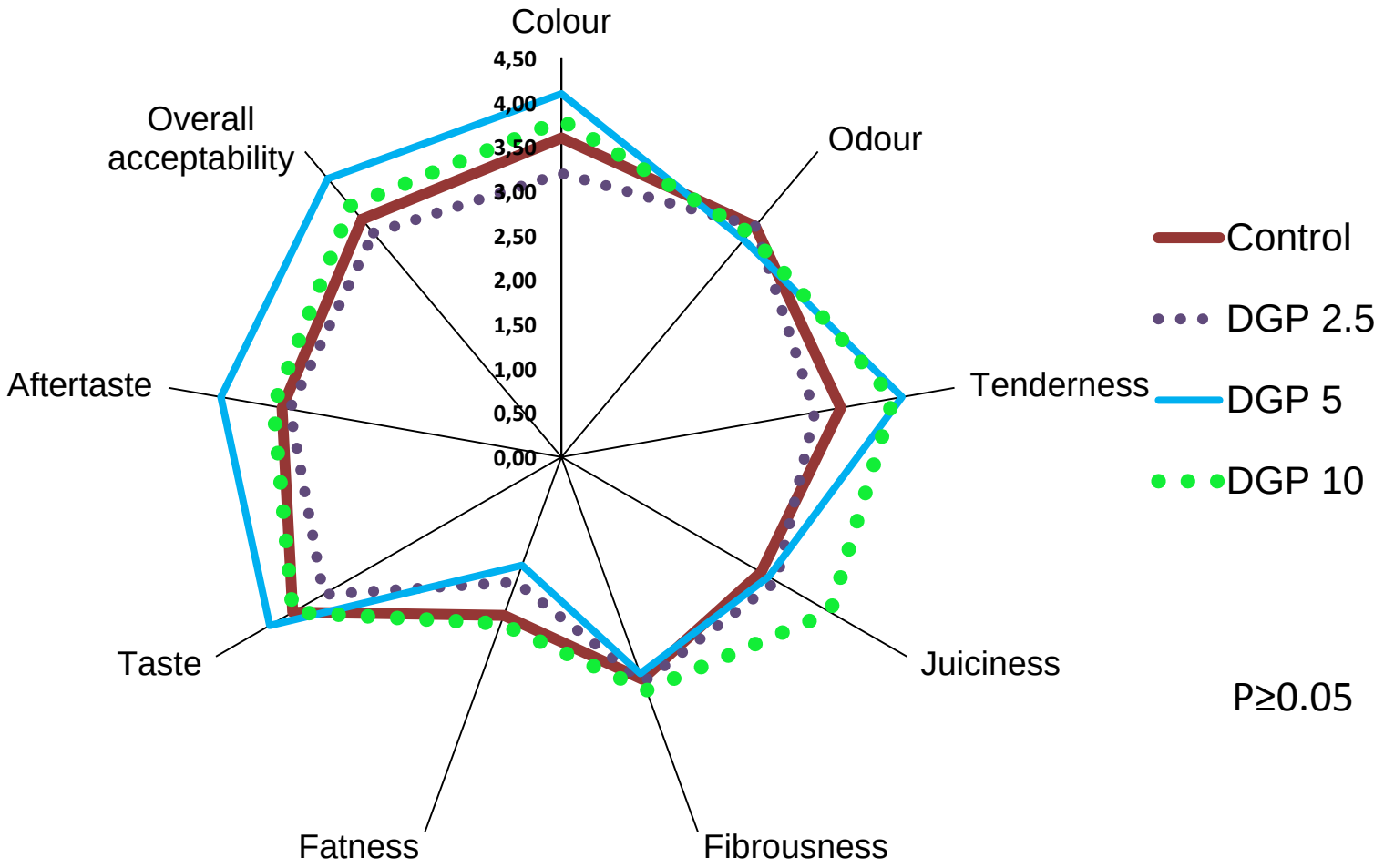


Results (V) : Breast colour difference (ΔE*) during storage at 4°C

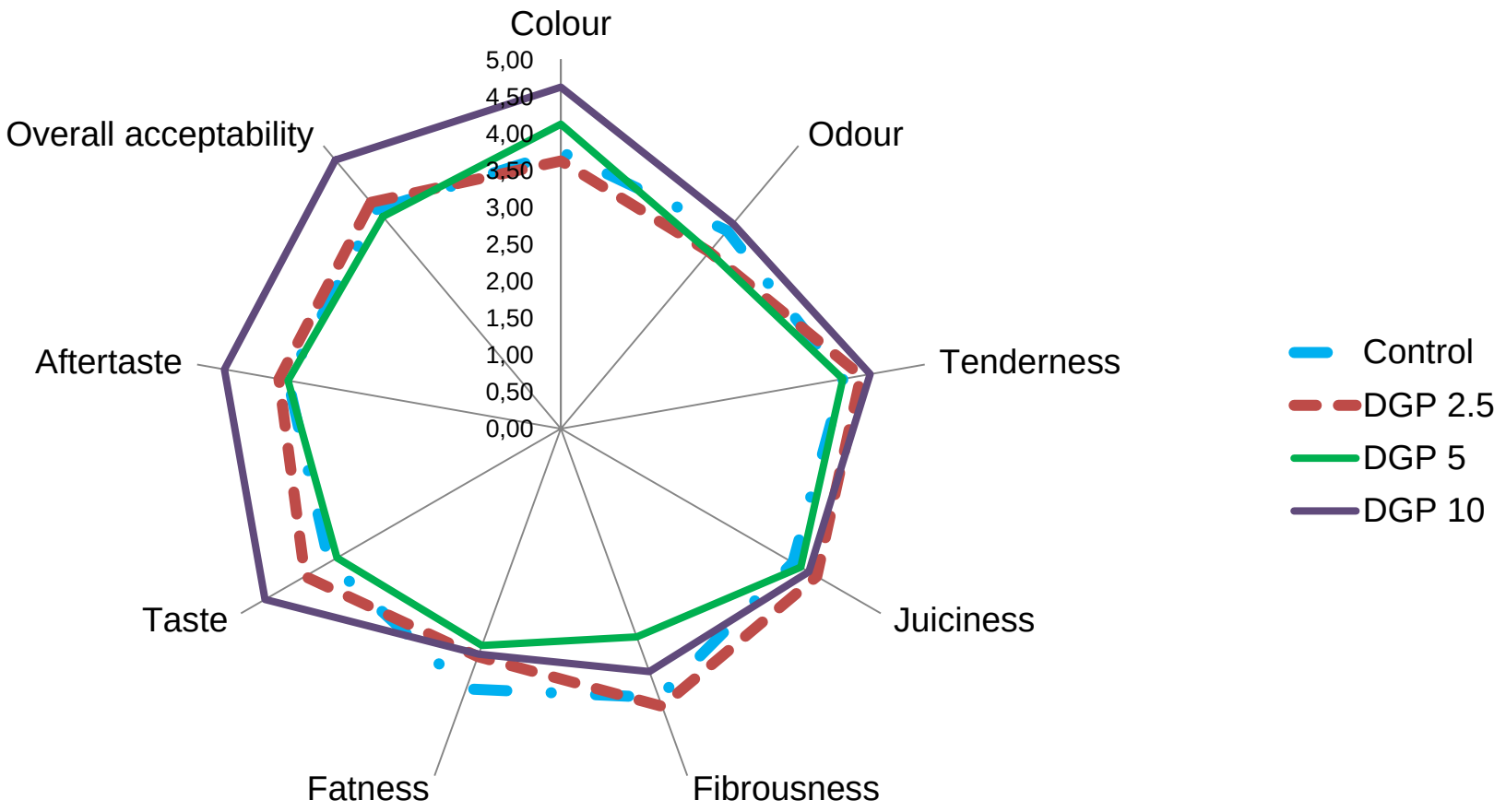


” E* = [(” L*)2 + (” a*)2 + (” b*)2]$^{1/2}$

Results (VI) : Breast muscle sensory evaluation



Results (VI) : Whole bird sensory evaluation



Conclusions

- Grape pomace supplementation did not affect broiler performance;
- Inclusion of grape pomace at levels up to 10g/kg feed did not result to enhanced protection against lipid oxidation during refrigerated storage;
- The highest scores for overall acceptability were recorded for the samples from the broilers supplemented with 5g grape pomace/kg feed.

Future research

- Optimisation of the processing procedure for the reutilisation of grape pomace;

- Determination of the minimum and the optimum supplementation levels required for enhanced antioxidant protection and meat quality characteristics.

Acknowledgements

MERCI POUR VOTRE ATTENTION!