FOUR RIVERS
CANINE SENIOR CENTER

Labrador Retrievers: Palatability and Scent Detection of Oxidation Levels in Poultry Meal

Jason W. Fowler[1], Jessica L. Varney[1], Jordan T. Weil[1], Mary Ann Boggess[1], B.J. Bench[2], & Craig N. Coon[1]
[1]Four Rivers Kennel, LLC, [2]Tyson Foods Ingredient Solutions Group

Introduction

Pet food made from high quality fresh and rendered meat products are considered safe and nutritious products. Currently, the main assessment of meat freshness and fat products is based on its peroxide value (PV), the primary measurement to determine initial state of lipid oxidation.[1] Research on how rancidity or peroxidation affects the health/safety of pets has not been adequately investigated.

Objective

To explore how Labrador retrievers interact with aromas associated to peroxide values and to determine any observable correlations between canine aromatic preference and differing poultry meal PV levels.

Methods

Animals & Housing

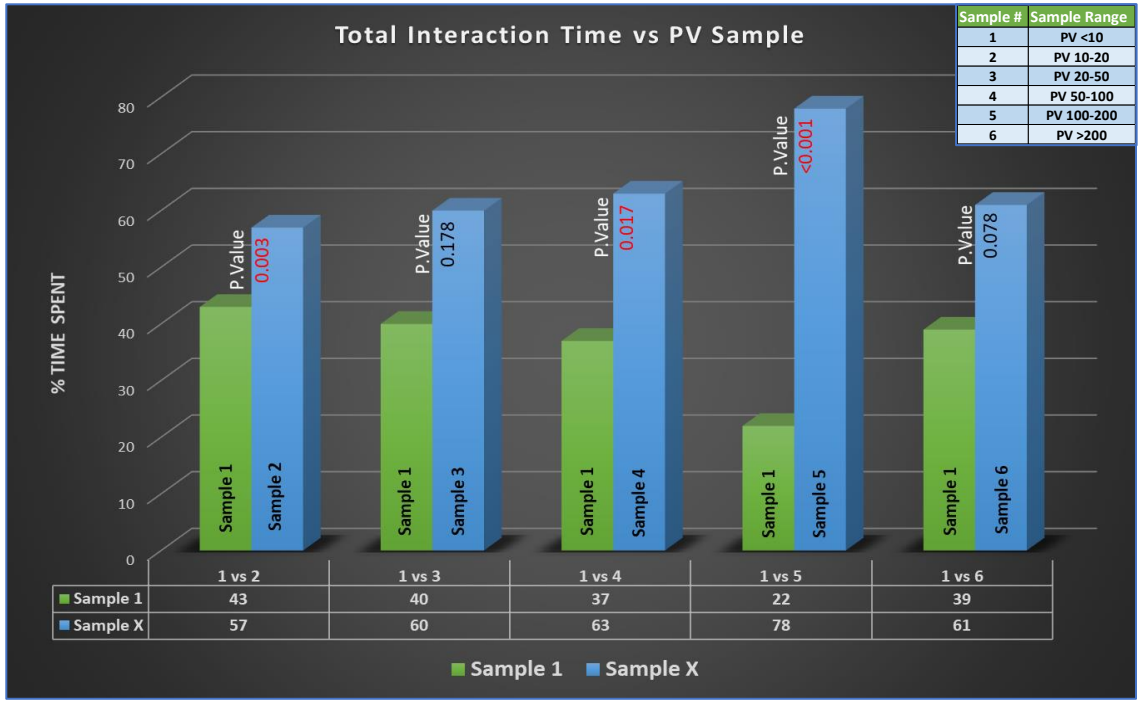
- All dogs selected from colony of Labrador Retrievers at Four Rivers Kennel.
- All dogs housed in controlled kennel environment and were aired outside in social groups for approximately six hours daily and kenneled individually overnight.
- Water ad libitum.

Diet & Treatment

- All dogs were fed only half of their daily diet amount prior to testing to ensure they were not satiated.
- Dogs were equally divided into two treatment groups based on sex and pilot screening criteria.

Pilot Study

- 60 dogs (30 male/30 female) were screened according to their willingness to interact repeatedly with aromatic boxes and for left/right bias. Dogs showing bias or lack of interest, were excluded from formal trial. This "pilot" was a crucial step in selecting dogs best suited for the aromatic palatability approach.



Sample #	Sample Range
1	PV <10
2	PV 10-20
3	PV 20-50
4	PV 50-100
5	PV 100-200
6	PV >200

	1 vs 2	1 vs 3	1 vs 4	1 vs 5	1 vs 6
Sample 1	43	40	37	22	39
Sample X	57	60	63	78	61

Formal Test Design

- Aromatic boxes designed to allow scent to escape for detection without allowing dog to breach or consume its contents.
- Tests were set up resembling a 2-pan palatability design.[2]
- Males tested first to minimize variability due to possible detection of female scent, causing distraction.
- Based on observation and interaction data, 10 dogs (5 male/5 female) were selected to participate in the formal trial. The formal trial roster was built from the 60 dogs pre-screened by pilot test, hand selecting the dogs with highest drive to interact with the aromatic boxes without directional bias.
- First approach and time interacting were both recorded. Dogs were given 60 seconds to interact during the pilot study but found 30 seconds sufficient for formal test.
- Total time spent interacting at each box was carefully recorded, simultaneously, by 3 technicians and ratios were calculated.
- All samples were compared with the sample with lowest known PV.

Test	Sample	Time Intx	Ratio
1vs2	1	3.38	0.43
	2	4.4	0.57
	SEM	0.8	0.03
	P.Value	0.3784	0.0028*
1vs3	1	2.56	0.40
	3	3.02	0.60
	SEM	0.8	0.1
	P.Value	0.6915	0.1776
1vs4	1	2.28	0.37
	4	5.02	0.63
	SEM	1.03	0.07
	P.Value	0.0774	0.0169*
1vs5	1	2.93	0.22
	5	8.87	0.78
	SEM	1.38	0.06
	P.Value	0.0109*	<0.0001*
1vs6	1	2.18	0.39
	6	6.31	0.61
	SEM	2.22	0.09
	P.Value	0.2043	0.0781

Results

First Approach

- First approach was found not to be significant at any level (40% ± 16% vs 60%±16%, P.Value 0.3979).

Preference

- **Total Interaction Time –** Dogs were given 30-seconds to interact with the aromatic box of its choice. Seconds spent interacting with each box was recorded by separate timekeepers for precision. Dogs spent significantly more time at sample 5 than 1 (8.87 to 2.93± 1.38 P.Value 0.011).
- **Total Interaction Time Ratios –** Total seconds spent at each aromatic box were added together and ratios were determined through dividing the seconds spent at each box by the sum of total time spent interacting at both boxes per test, then statistically analyzed. PV levels 2, 4, and 5 showed significantly higher interaction times and 6 neared significance, when compared to PV level 1 (*see table below*).

Conclusions

- Labrador retrievers seem to prefer the aroma of oxidation products, indicating higher PV to be more palatable.
- Further studies may include evaluating the intra/extracellular consequences these oxidation products may have *in vitro* on tight junctions, membrane permeability, as well as immunomodulatory responses that may be observed subsequent dietary consumption.

References

[1]Barriuso, B., Astiasarán, I., & Ansorena, D. (2012). A review of analytical methods measuring lipid oxidation status in foods: a challenging task. European Food Research and Technology, 236(1), 1–15. doi:10.1007/s00217-012-1866-9

[2]Aldrich, G., & Koppel, K. (2015). *Pet Food Palatability Evaluation: A Review of Standard Assay Techniques and Interpretation of Results with a Primary Focus on Limitations. Animals, 5(1), 43–55.* doi:10.3390/ani5010043