International Journal of Life Sciences
Available online at http://sciencescholar.us/journal/index.php/ijls
Vol. 2 No. 3, December 2018, pages: 136~141
e-ISSN: 2550-6986, p-ISSN: 2550-6994
https://doi.org/10.29332/ijls.v2n3.229

Effect of Carcass Aging towards Pork Organoleptic Quality of Bali Pig

Ni Luh Putu Sriyani [a], I Gede Suarta [b], Ni Luh Gde Sumardani [c], Budi Rahayu Tanama Putri [d], Wayan Sayang Yupardi [e]

Article history: Received 18 July 2018, Accepted: 30 August 2018, Published: 11 December 2018

Correspondence Author [a]

Keywords

aging;
bali pig;
carcass aging;
pork organoleptic quality;
pork quality;

Abstract

The research aims were to observe the effect of carcass aging on a different time to pork organoleptic quality of Bali pig. It used Completely Randomized Design with 4 treatments i.e. P0 = hot carcass without aging, P1 = carcass aging for 1 day, P2 = hot carcass aging for 2 days, P3 = carcass aging for 3 days. Pork samples for the organoleptic quality test were taken from part of *longgsimus dorsi* (LD). Data obtained were analyzed with none parametric test of Hedonic (Kruskal & Wallis, 1952). Variables observed were colour, aromatic, texture, taste, tenderness and overall acceptance. The research results showed that the best panel preference level to the pork colour was on the pork aging for 1 day (P1), then its decreased on day 2 and 3. Preference level of the panel to aromatic, taste, and tenderness of the pork aging for 1 to 3 days were increased significantly. The panel preference level to the pork texture aging for 1 to 3 days was not significant. Overall, the acceptance level of the pork aging for 1 day have the highest score. From data mentioned above could be concluded that the best organoleptic quality was the pork aging for 1 day.

Contents

[a] Universitas Udayana, Faculty of Animal Husbandry, Denpasar, Indonesia
[b] Universitas Udayana, Faculty of Animal Husbandry, Denpasar, Indonesia
[c] Universitas Udayana, Faculty of Animal Husbandry, Denpasar, Indonesia
[d] Universitas Udayana, Faculty of Animal Husbandry, Denpasar, Indonesia
[e] Universitas Udayana, Faculty of Animal Husbandry, Denpasar, Indonesia

1. Introduction

Meat is the definition as all animal tissue and products of all the tissues that can be eaten and no causes health disturbance for it consumers (Soeparno, 2005). Generally, animal protein needs are obtained from beef, goat meat, pork, poultry meat, and fish. One of many chosen is the pork due to its high nutritive value to consume (Antara *et al*., 2008). In general, the area used for developing pig in Bali are places where Hindu society stay. One of the pig type developed in Bali is a local pig (Bali pig). It is a genuine pig of Indonesia as a source of pork in it. So that, the development of pig livestock has a good prospect. The increasing of income per capita in Bali, some of its population increase and their consciousness to consume animal protein is increased too causes it needs an increase.

Based on research of Suandana (2016) that the pork of Bali pig is stiffer than Landrace or the pork of Bali pig is less tender than the Landrace. So that, it needs to do some efforts to increase its tenderness quality, for example, to implement technical aging of meat after slaughter. Aging is fresh meat handle after slaughter with hang method or keeps it a certain time on the temperature above the frizzing point of meat (-1.5^{0}C). During aging, activities enzyme occurred to disrupt meat tissues. Miwada *et al.,* (2018), the meat becomes more able to bind water, more tenderness, and a stronger flavour.

In Bali, aging on the carcass of the pig is not common to implement at markets or animals slaughterhouses. Generally, the pork in Bali is consumed in fresh condition or before aging. Data about the effects of aging on organoleptic of pork is not much. Therefore, this opportunity is used to do research to increase the organoleptic quality of pork of Bali pig with the implementation of technical aging before consumed.

2. Materials and Methods

Location and Length of the Research

Slaughter of Bali pig to obtain carcass of suckling pig was conducted at traditional animals slaughterhouse at Buduk, Mengwi area. Aging was conducted in an aging room of Aroma Duta Rasa Ltd., and the Physical quality test was conducted in the Laboratory of Animal Products Technology and Microbiology, Faculty of Animal Science, Universitas Udayana, Denpasar. Length of the research was about 6 months from preparation to the end of it.

Research Materials

The research materials used were Bali pig on the age of about 3 months and body weight about 25 kg, and it is used very often for suckling pig. The pigs were reared with the extensive system and fed what available around them by farmers. The pigs were slaughtered at the traditional animal's slaughterhouse. Afterword, their carcass were treated with an aging process where they hung through Achilles tendon in the aging room on the temperature 0^{o}C. Pork samples, *Longissimus dorsi* (LD), was used for the organoleptic quality test.

Research Design

The research design used was Completely Randomized Design with 4 treatments aging lengthen and each treatment consisted of 4 replicates of carcasses. Aginglenghten treatment which would be applied on the

research was carcass control (fresh)/no aging (P1), while others with 1, 2, and 3 days aging. Overall treatment namely treatment 1 (Control), treatment 2 (1-day aging), treatment 3 (2 days aging), and treatment 4 (3 days aging). Pork organoleptic quality test was conducted to colour, aromatic, texture, tenderness and overall acceptance with used Larmond (1977) method (in Sudibyo *et al.,* (1991). Fried pork with certain codes was offered to 20 panels to give a score based on the eye test. Score 1 = doesn't like it very much, 2 = doesn't like it, 3 = ordinary food, 4 = like it, 5 = like it very much.

Statistical Analysis

The research data was analyzed with none parametric analysis with Hedonik's test (Kruskal Wallis in Alois, 1987).

3. Results and Discussions

3.1Result

Based on comparative analysis with used none parametric pork of Bali pig aging on different time showed that the preference level of the panels to the pork colour was a significant difference ($P < 0.05$). P1 (1-day aging) was the best favorite pork colour for the panel preference, then it decreased on day 2 and 3. The panel preference level to the pork aromatic was a significant difference ($P < 0.05$). The preference level of the panel to aromatic aging pork for 1 day up to 3 days was increased trendily.

Table 2
Effect of aging length of the carcass to pork organoleptic quality on different time

Variable	Treatment			
	P0	P1	P2	P3
Colour	$3,4^{b}$	$4,46^{c}$	$2,87^{ab}$	$2,6^{a}$
Aromatic	$3,27^{a}$	$3,6^{a}$	$3,87^{b}$	$3,93^{b}$
Texture	$3,67^{a}$	$3,60^{a}$	$3,65^{a}$	$3,53^{a}$
Taste	$3,47^{a}$	$4,13^{b}$	$4,20^{b}$	$4,33^{b}$
Tenderness	$3,87^{a}$	$3,80^{b}$	$4,27^{b}$	$4,33^{b}$
Overall acceptance	$3,93^{b}$	$4,13^{b}$	$,07^{b}$	$3,47^{a}$

Note:
P0 = Pig carcass without aging
P1 = Pig carcass aging for 1 day
P2 = Pig carcass aging for 2 day
P3 = Pig carcass aging for 3 day

Preference level of the panel to pork texture was no significant ($P < 0.05$). Preference level of the panel to the pork texture aging for 1 to 3 days was not significant. Preference level of the panel to pork taste aging was a significant difference ($P < 0.05$). Preference level of the panel to pork taste aging for 1 to 3 days increased trendily. Preference level of the panel to pork tenderness was a significant difference ($P < 0.05$). Preference level of the panel to pork aging for 1 to 3 days increased trendily. Preference level of the panel to the overall acceptance of the pork was a significant difference ($P < 0.05$). Preference level of the panel to the overall acceptance of the pork aging for 1 day have the highest score.

3.2 Discussion

The best preference of panel to the pork colour was the aging for 1 day (P!), then it decreased on day 2 and 3. Colour decreased on those days where the colour becomes dark red toward brown due to a long time of aging. This would increase pH of the pork and it affects to the pork colour, it is no more bright and it may dark. Colour of cut fresh pork is red, namely myoglobin. Presentation of O_2 around it caused the pork to become red

bright due to oxygenation of myoglobin to be oxymyoglobin. Oxygen entered into tissues to facilitate biochemistry reaction in it. On long-term aging, the oxygen is getting less. Low oxygen concentration (1–2%) caused oxidation of Fe^{+2} to be $Fe^{+3}$and bind with water to form brown metmyoglobin. It is supported by Lawrie (2003) that water associated with protein caused oxidation of myoglobin, so the colour of the pork is dark.

Preference of panel level to the pork aromatic aging for 1 to 3 days trend to increase Aging could increase the pork palatability due to specific aromatic or flavour of the pork. According to Laurie (2003) that break down of protein and fat during aging have a donation in taste and flavour with formed of hydrogen sulfide, ammonia, acetaldehyde, acetone, and diacetyl. During aging, glycolysis process occurred and on pH5.5 proteolytic enzyme activity (cathepsin) degraded sarcolemma membrane and myofibril and caused the pork to become tender. Beside that proteolytic enzyme (cathepsin on pH5.5 could make wider meat structure, so its water holding capacity is increased (Forrest *et al.,* 1975). Panel preference level to the pork texture aging for 1 to 3 days was no significant difference. Panel preference level to pork tastes aging for 1 to 3 days trend to increase. The presentation of different aromatic and taste showed that the longer the aging, the more capable to increase aromatic and taste of the pork of Bali pig. Aging could increase the palatability of meat due to specific aromatic or flavour. According to Lawrie (2003), protein and fat frictions during aging have donation on taste and flavour with *formed hydrogen sulfide, ammonia, acetaldehyde, acetone,* and *diacetyl.* This was supported by Soeparno who said that taste and aromatic of cooking meat is much affected by the length of keeping time and condition and aging after slaughter.

Panel preference level to the tenderness of the pork aging for 1 to 3 days trend to increase. The pork would change become tender if it aging ordinarily because during aging changes occur in intracellular and extracellular protein. This autolysis process produced meat tenderer, watery and better flavour (Lawrie, 2003). Research result of Roswita Sunarlim. R and H. Setiyanto (2001) reported that aging could increase mutton tenderness significantly on temperature aging room 4^{o}C for 12 hours in 1 week compared to fresh meat (without aging). During aging, glycolysis occurs, on pH 5.5 *proteolytic* enzyme (cathepsin) degraded sarcolemma membrane and myofibril caused tender meat. Panel preference level to the overall acceptance of aging pork for 1 day has the highest score. Acceptance value was part of sensory parametric meat for consumer's preference level to all character of meat sensory. The end evaluation of meat acceptance was based on overall consumer's acceptance value and this was used by panels to make a decision which one of meat is the most preferred by themselves. Satisfaction of meat consumers depends on physiological and sensory responses each of them. Although its aromatic, taste and tenderness trend increased significantly on aging day 2 and 3, the panels choose the pork aging on day 1. This was due to the brightest colour of the pork occurred on day 1aging. Respondents tend to choose the colour of meat as the first decision because it can be seen visually.

4. Conclusion

From the research results, it could be concluded that the best pork organoleptic quality on Bali pig was 1-day aging.

Acknowledgments
The authors thank Aroma Duta Rasa Ltd. for its help to lend us an aging room during the study. Thanks also to the Laboratory of Animal Products and Microbiology staff, Faculty of Animal Science, Universitas Udayana for their help to work on variables of pork Pork physical quality.

References

Alois, E. B. I. (1987). Statistische Methoden in der Tierproduktion. *Eine Anwendungsorientierte Einfuhrung. Osterr. Agrarverlag Wien*.

Antara, N. S., Dauh, I. B. J. U., & Utami, N. M. I. S. (2008). Tingkat cemaran bakteri coliform, Salmonella sp., dan Staphylococcus aureus pada daging babi (Studi kasus Rumah potong hewan Sanggaran dan pasar Badung, Bali).

Forrest, J. C., Aberle, E. D., Hedrick, H. B., Judge, M. D., & Merkel, R. A. (1975). *Principles of meat science*. WH Freeman and Co..

Kruskal, W. H., & Wallis, W. A. (1952). Use of ranks in one-criterion variance analysis. *Journal of the American statistical Association*, *47*(260), 583-621. https://doi.org/10.1080/01621459.1952.10483441

Larmond, E. (1977). *Laboratory methods for sensory evaluation of food*. Research Branch, Canada Dept. of Agriculture.

Lawrie, S. M., Whalley, H. C., Job, D. E., & Johnstone, E. C. (2003). Structural and functional abnormalities of the amygdala in schizophrenia. *Annals of the New York Academy of Sciences*, *985*(1), 445-460. https://doi.org/10.1111/j.1749-6632.2003.tb07099.x

Miwada, I. N. S., Sumadi, I. K., Wrasiati, L. P., & Sutama, I. N. S. (2018). Gelatin characteristics of Bali cattle skin protein extract on acetic acid concentration and different length of curing. *International Journal of Life Sciences*, *2*(2), 12-21. https://doi.org/10.29332/ijls.v2n2.119

Soeparno, E. (2005). Ilmu dan Teknologi Daging Cetakan keempat.

Soeparno, E. (2005). Ilmu dan Teknologi Daging Cetakan keempat.

Suandana, I W. E. E., N. L. P. Sriyani & M. Hartawan 2016. Studi Perbandingan Kualitas Organoleptik Daging Babi Bali dengan Daging Babi *Landrace*. *E-Journal Peternakan Tropika*. *Vol. 4 No. 2 Th. 2016: 405 – 418*

Sudibyo, A., Ronohardjo, P., Patten, B., & Mukmin, Y. (1991). Status brucellosis pada sapi potong di Indonesia. *Penyakit Hewan*, *23*(41), 18-22.

Biography of Authors

Dr. Ni Luh Putu Sriyani, S.Pt, MP. graduated her bachelor degree in Universitas Udayana, Faculty of Animal Husbandry. She finished her master degree in Animal Science at Universitas Gadjah Mada. She completed her doctoral degree in Universitas Udayana, animal husbandry science.
Email: sriyaninlp@unud.ac.id

Ir. Gede Suarta, M.Si. graduated his bachelor degree in Universitas Udayana, Faculty of Animal Husbandry. He finished his master degree in Institut Pertanian Bogor.
Email: gedesuarta8@unud.ac.id

Ni Luh Gde Sumardani, S.Pt, M.Si. graduated her bachelor degree Universitas Udayana, Faculty of Animal Husbandry. She finished her master degree in Institut Pertanian Bogor.
Email: nlg_sumardani@yahoo.com

Dr. Ir. Budi Rahayu Tanama Putri, S.Pt., MM. graduated her bachelor degree in Universitas Udayana, Faculty of Animal Husbandry. She finished her master degree in Animal Science at Universitas Gadjah Mada. She completed his doctoral degree in Universitas Udayana, animal husbandry science.
Email: tanamaputri@unud.ac.id

Prof. Ir. Wayan Sayang Yupardi, M.Agr.S. is a professor in the Faculty of Veterinary Medicine and Animal Husbandry, Universitas Udayana, Postgraduate Animal Production Agricultural, and Forestry, University of Melbourne Australia.
Email: sayang_yupardhi@unud.ac.id