

PROCEEDING



The 3rd Animal Production International Seminar
The 3rd ASEAN Regional Conference on Animal Production
3rd APIS & 3rd ARCAP – 2016

Enhancing Synergistic Roles of Stakeholders
for Development of Sustainable Livestock Production



ISBN : 978-602-432-017-1

Perpustakaan Nasional: Katalog dalam Terbitan (KDT)

Proceeding 3rd Animal Production International Seminar (3rd APIS) & 3rd ASEAN Regional Conference on Animal Production (3rd ARCAP)

© UB Press

Cetakan Ketiga, 2016

Hak Cipta dilindungi Undang-Undang
All Right Reserved

Penulis : Dr.Ir. Marjuki, M.Sc (Ed.)
Aswah Ridhowi, M.Sc (Ed.)
Wike Andre, M.Si (Ed.)

Perancang Sampul : Tim Prosiding
Penata Letak : Tim UB Press
Pracetak dan Produksi: Tim UB Press

Penerbit:



UB Press

Jl. Veteran 10-11 Malang 65145 Indonesia

Gedung INBIS Lt.3

Telp : 0341-554357, Fax: 0341-554357 (call)

E-mail : ubpress@gmail.com/ubpress@ub.ac.id

Website : <http://www.ubpress.ub.ac.id>

ISBN: 978-602-432-017-1

viii +724 hlm, 21 cm x 29,7 cm

*Dilarang keras memfotokopi atau memperbanyak sebagian atau seluruh buku ini
tanpa seizin tertulis dari penerbit*

STEERING COMMITTEE

- Prof.Dr.Sc.Agr. Suyadi, MS. (Brawijaya University, Indonesia)
- Prof.Dr. Kusmartono (Brawijaya University, Indonesia)
- Prof. Ifar Subagiyo, Ph.D. (Brawijaya University, Indonesia)
- Prof. Hendrawan Soetanto, Ph.D. (Brawijaya University, Indonesia)
- Prof.Dr. Abdul Razak Alimon (Universiti Putra Malaysia, Malaysia)
- Prof.Dr. Ali Agus, (Indonesian Society of Animal Science)
- Dr. Abu Hasan (Malaysian Society of Animal Production)
- Prof. Liang Chou Hsia, Ph.D. (National Pingtung University of Science and Technology, Taiwan)
- Prof.Dr. E.R. Ærskov (International Feed Resources Unit, Macaulay Land Use Research Institute-MLURI, Scotland, UK).
- Assoc.Prof. Dr. Suntorn Wittayakun (Faculty of Science and Agriculture Technology, Rajamangala University of Technology Lanna, Thailand)
- Prof.Dr. Zaenal Fanani (Brawijaya University, Indonesia)
- Prof.Dr. Djalal Rosyidi (Brawijaya University, Indonesia)
- Prof.Dr. Budi Hartono (Brawijaya University, Indonesia)
- Prof.Dr. Luqman Hakim (Brawijaya University, Indonesia)

SCIENTIFIC COMMITTEE

- Prof.Dr. Trinil Susilawati (Brawijaya University, Indonesia)
- Prof.Dr. Abdul Razak Alimon (Universiti Putra Malaysia, Malaysia)
- Prof.Dr. Ramli Abdullah (Universiti Malaya, Malaysia)
- Cynthia D.K. Bottema, Ph.D. (University of Adelaide, Australia)
- Prof. Marsetyo, Ph.D. (Tadulako University, Palu, Central Sulawesi, Indonesia)
- Dr.Umar Papatungan (Sam Ratulangi University, Manado, North Sulawesi, Indonesia)
- Assist. Prof.Dr. Wilaiporn Chanchai (Faculty of Science and Agriculture Technology, Rajamangala University of Technology Lanna, Thailand)
- Prof.Dr. Siti Chuzaemi (Brawijaya University, Indonesia)
- Dr. Gatot Ciptadi (Brawijaya University, Indonesia)
- Dr. Lilik Eka Radiati (Brawijaya University, Indonesia)
- Dr. Osfar Sjofjan (Brawijaya University, Indonesia)
- Dr. Masdiana Ch Padaga (Brawijaya University, Indonesia)
- Dr. Eko Widodo (Brawijaya University, Indonesia)
- Dr. Mashudi (Brawijaya University, Indonesia)
- Dr. Ita Wahyu N (Brawijaya University, Indonesia)
- Hari Dwi Utami, Ph.D (Brawijaya University, Indonesia)
- Anie Eka K., M.Sc (Brawijaya University, Indonesia)

ORGANIZING COMMITTEE

Honorary Chairperson

- Prof.Dr. Mochammad Bisri (Rector/President, Brawijaya University, Malang, Indonesia)
- Prof.Dr. Kusmartono (Vice-Rector of Academic Affair, Brawijaya University, Malang, Indonesia)
- Prof.Dr.Sc.Agr.Ir. Suyadi (Dean, Faculty of Animal Husbandry, Brawijaya University, Malang, Indonesia)

Chairman Dr.Ir. Marjuki, M.Sc.

General Secretary

Chairperson Aswah Ridhowi, M.Sc.
Members Wike Andre, M.Si

Treasurers

Chairperson Asri Nurul Huda, MP., M.Sc
Vice-chairperson Dr. Ir. V. M Ani N., M.Sc

Secretariat Team

Chairperson Firman Jaya, MP
Vice-chairperson Dr. M. Halim Natsir
Members Jaisy Aghniarahim Putritamara., MP
Mr. Arifatul Hafidz Achsan

Fund Raising and Sponsorship Committee

Chairperson Aulia Puspita A. Y., MP., M.Sc
Vice-chairperson Dr. Kuswati,
Member Yuli Frita N., MP., M.Sc

Program Committee

Chairperson Dr. Herly Evanuarini
Members Dr. Siti Azizah
Trianti Djoharjani, M.Agr. St
Awang Tri Satria, ME

Consumption Committee

Chairperson Dr. Tri Eko Susilorini
Members Dr. Sri Minarti
Aris Sri Widati, MS
Ria Dewi Andriani, MP., M.Sc

Receptionist Team

Chairperson Poespita Sari Hazanah N., MP
Members Premy Puspitawati R., MP
Mulia Winirsya Apriliyani, MP

Field Trips Committee

Chairperson Firmansyah Tri MP
Members Dr. Agus Susilo
Mr. Djarot Sunarto

Transportation Committee

Chairperson	Dr. Agus Budiarto
Members	Mrs. Nadhiroh
	Mr. Sutikno
	Mr. Yusuf

Venue and Documentation Committee

Chairperson	Nanang Febrianto, MP
Members	Hely Tistiana, MP
	Mr. Kusno Waluyo
	Mr. Rosyidi
	Mr. Zaenal Abidin
	Ms. Dita Anggraini

OUTLINE OF THE CONGRESS

Congress Name:

3rd Animal Production International Seminar (3rd APIS) & 3rd ASEAN Regional Conference on Animal Production (3rd ARCAP)

Themes:

Enhancing Synergistic Roles Of Stakeholders for development Of Sustainable Livestock Production

Chairman:

Dr.Ir. Marjuki, M.Sc (Brawijaya University, Indonesia)

Date:

19-21 October 2016

Venue:

Royal Orchid Garden Hotel and Condominiums The Shining City of Batu

Official Website:

<http://apis.ub.ac.id>

Secretariat for APIS 2016:

Faculty of Animal Husbandry Brawijaya University, Malang Indonesia

Telephone +62 341 553513

Mobile/ Line/ WA: +62 857 076 327 91

E-mail : info.apis@ub.ac.id

Physical Characteristics and Mineral Composition of Bone Meals Produced from Different Body Parts of Cattle Bones by Open-Air Burning and Limed-Water Soaking

Khalil, Reswati, Ferawati, Y.F. Kurnia and F. Agustin

*Department of Animal Nutrition and Feed Technology, Faculty of Animal Science,
Andalas University, Campus II Payakumbuh, West Sumatra, Indonesia
Corresponding email: khalil@faterna.unand.ac.id*

Abstract

The study was aimed to measure physical characteristics and mineral composition of bone meal produced by simple processing methods from different body parts of inedible cow bones. Samples of inedible bones which were grouped into three body parts: head, arms, and rib were collected at three different meat processing companies: slaughter house, local meat shops and beef offal processor. The bones were then processed into bone ash and bone meal by open-air burning and limed-water soaking prior to grinding. Parameters measured included: percent of meal yield; content of crude ash, Ca and P; physical properties and particle size distribution. Results showed that meal yield of bone ash processed by open-air burning (67.3%) was found significantly lower ($P < 0.01$) than bone meal produced by limed-water soaking (91.4%). However, mineral Ca (33.9%) and P (7.9%) content of bone ash were significantly higher ($P < 0.05$) than that of bone meal (Ca: 26.7% and P: 1.8%). Particle size and distribution of particle size of bone ash and bone meal were found not significantly different. There was also no significant effect of different body parts of bones on meal yields, mineral composition and particle sizes. It was concluded that production of bone meal by open-air burning gave lower meal yield, but higher Ca and P concentrations than that of produced by limed-water soaking.

Keywords: *inedible bones, bone ash, bone meal*

Introduction

Calcium (Ca) and phosphorus (P) are two macro minerals that are normally taken into account in formulation of diet for livestock animals due to their various important functions in the body and metabolism. The province of West Sumatra abounds with Ca sources such as limestones and oyster shells (Khalil, 2003; Khalil and Anwar, 2007), but the use of these local minerals in the diets of chicken gave no significant positive effects on egg production, egg quality, growth rate and feed utilization efficiency presumably due to limited P concentration (Khalil, 2004; 2006; 2007; 2010; Khalil and Anwar, 2008). Proper utilization of Ca is affected not only by their sources and amount, but also by their ratio to P. The optimum Ca:P ratio is about 1.5-2:1 (Weaver and Heaney, 1999).

Bone meal is a potential source of P. Bone meal could locally produced from cattle bone as byproduct of slaughter houses that are available throughout the province areas. Bone meal contains Ca and P of about 31-39 and 14-19%, respectively (Kling and Woehlbier, 1983). The objectives of the present research were to measure physical characteristics and mineral composition of bone meal produced from different body parts of inedible cow bones by open-air burning and limed-water soaking processes.

Methodology

The study was initiated by taking samples of inedible bones at three different meat processing companies: slaughter house, local meat shops and beef offal processor in Payakumbuh city of West Sumatra. They were grouped into three body parts: head, arms and rib. Samples of fresh bones in each body part were divided into two groups and each group was subdivided into 3 sub-groups of about 2 kg each. Bones were then washed and boiled in a pressure cooker for about 4 h to free of fat, meat and other soft parts. The clean bones were then dried in the sun. The sun-dried samples were then crushed into chips with uniformly to the lengths of 2-3 cm. The first groups were intended to open-air burning. They were burned on a metal plate, cooled and then ground into meal form.

The second part of samples were soaked in 10% lime water for 5 days, and then dried in oven at 60°C for 48 h. The dried bones were then ground into meal form. The meals were chemically analyzed for crude ash, DM, Ca, and P content (AAS, 1980). Physical properties measured included bulk density, angle of responses and particle sizes. Data were statistically analyzed in completely factorial design of 2x3x3. There were 2 processing methods, 3 different body parts and 3 replications (Steel *et al.*, 1997).

Results and Discussion

Data on meal yield rate, mineral composition and physical properties of bone meal produced from different body parts of inedible bones by open-air burning and lime-water soaking are presented in Table 1. Rate of meal yield ranged from 64.5 to 91.9%. The average meal yield of bone ash produced by open-air burning (67.3%) was found significantly lower ($P < 0.01$) than bone meal produced by limed-water soaking (91.4%). There was no significant effect of different body parts of bones on the rate of meal yields.

Table 1. Rate of meal yields, mineral composition and physical properties of bone ash and bone meal produced from different body parts of inedible bones

Parameter	Bone ash				Bone meal			
	Head	Arms	Rib	Mean	Head	Arms	Rib	Mean
Rate of meal yield, %	71.72 ^b (0.61)	64.55 ^b (0.73)	65.51 ^b (0.76)	67.26^B (0.65)	91.88 ^a (0.79)	92.14 ^a (1.52)	90.31 ^a (1.33)	91.44^A (1.18)
Crude ash and mineral composition, % DM:								
- Crude ash	87.05 ^a (0.65)	85.76 ^a (1.36)	84.72 ^a (0.95)	85.85^A (0.47)	72.69 ^b (1.09)	64.37 ^b (0.96)	62.07 ^b (2.96)	66.38^B (1.01)
- Ca	32.43 ^a (2.47)	34.71 ^a (0.34)	34.43 ^a (0.09)	33.86^A (0.77)	29.27 ^b (0.49)	27.95 ^b (1.33)	27.95 ^b (1.33)	26.68 (1.37)
- P	7.75 ^a (0.52)	8.06 ^a (0.17)	7.86 ^a (0.09)	7.89^A (0.23)	0.43 ^c (0.12)	4.52 ^b (0.43)	0.36 ^c (0.13)	1.77^B (0.19)
Physical properties:								
- Bulk density, g/ml	0.94 (0.01)	0.85 (0.02)	0.88 (0.01)	0.89 (0.01)	0.99 (0.00)	0.75 (0.01)	0.84 (0.01)	0.86 (0.00)
- Angle of response, °	49.94 ^a (0.41)	50.48 ^a (0.35)	51.14 ^a (0.22)	50.52^A (0.23)	43.46 ^b (0.79)	44.83 ^b (0.17)	45.31 ^b (0.66)	44.53^B (0.12)

¹⁾ (SEM): standard error of the mean;

²⁾ abc Means within same row with different superscripts are significantly different ($P < 0.05$)

Bone ash processed by open-air burning showed significantly higher content of crude ash (85.8%), Ca (33.9%) and P (7.9%) than bone meal by limed-water soaking (ash:66.4%; Ca: 26.7%; P:1.8%). The average P content of bone meal from (1.8%) was much lower than bone ash produced by open-air burning (7.9%). The P content of bone meal produced from arm bones (4.5%) was significantly higher than that of other body parts (0.36 and 0.43%). The average P content of bone ash (7.9%) and bone meal (1.8%) in the present study was much lower in compare to that reported by Kling and Woehlbier (1983) of 14 and 19%, respectively.

Bulk density of bone meals ranged from 0.75-0.99 g/ml and there was no statistically different in bulk density. Bone meal produced by limed-water soaking showed significantly ($P < 0.05$) lower angle of response (44.5°) in compare to meal produced by open-air burning (50.5°). Bone meal produced by lime-water soaking tended to have higher particle size, so that the particles in this product were more mobile than the bone meal produced by open-air burning.

Conclusion

It was concluded that production of bone meal by open-air burning gave lower meal yield, but higher Ca and P concentrations than that of produced by limed-water soaking prior to grinding. Bone ash was better source of P in compare to bone meal.

Acknowledgement

The authors are particularly grateful to the Minister of Research, Technology and Higher Education of Indonesia for financial support.

References

- AAS. 1980. Analytical Methods for Atomic-Absorption Spectrophotometry. Perkin-Elmer Corporation, Norwalk, Connecticut, USA.
- Khalil, 2003. Analisa rendemen dan kandungan mineral cangkang pensi dan siput dari berbagai habitat air tawar di Sumatera Barat. J. Peternakan dan Lingkungan. 9 (3): 35-41.
- Khalil, 2004. Pengaruh penggilingan dan pembakaran terhadap nilai nutrisi kulit pensi sebagai sumber utama mineral kalsium dalam ransum ayam broiler. Jurnal Peternakan dan Lingkungan, 10 (1):35-42.
- Khalil, 2006. Respons ayam kampung terhadap penambahan kalsium asal siput (*Lymnae sp*) dan kerang (*C. molktiana*) pada kondisi ransum miskin fospor. Med.Peternakan,29(3):169-175.
- Khalil, 2007. Peningkatan nilai nutrisi cangkang siput sebagai sumber mineral pada ransum ayam buras periode grower. J. Pet. Indonesia, 12(1):53-59.
- Khalil dan S. Anwar. 2007. Studi komposisi mineral tapung batu Bukit Kamang sebagai bahan pakan mineral. Med. Peternakan. 30 (1): 18-25.
- Khalil and S. Awar, 2008. Limestone of Bukit Kamang as a calcium source for laying hens. J. Peng. Peternakan Trop. 34(3):174-180.
- Khalil. 2010. Penggunaan formula mineral lokal dalam ransum ayam petelur. Med. Peternakan, 33(2):115-123.
- Kling, M. und W. Wöhlbier, 1983. Handelsfuttermittel, Band 2A. Verlag Eugen Ulmer, Stuttgart.
- Steel. R.G.D, J.H. Torrie & J.H. Dicky. 1997. Principles and Procedures of Statistics: A Biometritrical Approach. 3rd Ed. McGraw-Hill Book Co. Inc., New York, USA.
- Weaver, C.M. and R.P. Heaney, 1999: Calcium. In: Modern Nutrition and Disease, M. E. Shils, J. A. Olson, M. Shike and A. C. Ross (Ed.), Williams and Wilkins, Baltimore MD, USA, pp. 141-155.