Prosiding Seminar Nasional AINI V

" *Pengembangan Nutrisi dan Bioteknologi Pakan sebagai Pendorong Agroindustri di Bidang Peternakan*

Malang, 10 Agustus 2005

Kerjasama

Asosiasi Ahli Nutrisi dan Pakan Indonesia (AINI)
dan
Jurusan Nutrisi dan Makanan Ternak
Fakultas Peternakan, Universitas Brawijaya, Malang

KAJIAN PENDUGAAN ME DARI DE PADA SAPI, KERBAU DAN DOMBA DI INDONESIA

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ABSTRAK

Sejumlah 100 data kesetimbangan energi yang diperoleh dari ternak Indonesia, terdiri dari 36 data dari domba lokal, 24 data dari kerbau lumpur, 12 data dari sapi Peranakan Limousin (PL) dan 28 data dari sapi Peranakan Ongole (PO) digunakan untuk mengetahui proporsi nilai energy termetabolis (ME) dari energi tercerna (DE) pada ternak di Indonesia. Data tersebut diperoleh dari 14 penelitian tentang kesetimbangan energi dengan berbagai macam perlakuan pakan. Nilai ME ditentukan dengan mengukur energi yang dikonsumsi, energi yang keluar melalui feses, urin dan gas methan dengan metode total koleksi. Total koleksi di dilaksanakan selama 7 hari untuk domba dan 5 hari untuk sapi dan kerbau, setelah ternak terlebih dulu dibiasakan dengan pakan perlakuan sedikitnya 2 minggu. Produksi methan diukur dengan metode *Facemask* yang dilengkapi dengan *Methane analyser* (Horiba, Jpn) selama 10 menit dengan interval 3 jam selama 2 hari segera setelah berakhirnya periode total koleksi. Produksi methan ini kemudian dikonversikan menjadi produksi total harian.

Hasil studi ini menunjukkan bahwa nilai ME domba lokal Indonesia, kerbau, sapi PO dan sapi PL masing masing adalah 78.0, 74,1 72,5, dan 74,3% dari nilai DE. Nilai ME tersebut lebih rendah dibandingkan 80% yang direkomendasikan oleh ARC (1980), atau 82% yang direkomendasikan oleh Japanese feeding standard (AFFRCS, 1999). Hasil ini menunjukkan bahwa proses metabolisme dalam kondisi panas dan lembab seperti di Indonesia kurang efisien jika dibandingkan dengan pada kondisi sub-tropis.

Kata kunci: *DE, ME, kerbau, Sapi, Domba.*

ABSTRACT

A total of 100 data of energy balance trials from Indonesian livestock, composed of 36 data from indigenous sheep, 24 data from swamp buffaloes, 12 data from grade Ongole-Limousin Crossbred cattle, and 28 data from Grade Ongole cattle were used to study the proportion of metabolisable energy (ME) from digestible energy (DE). Those data were obtained from 14 balance trials of various feeding treatments. Metabolisable energy was determined by measuring gross energy intake, energy loss in form of faeces, urine and methane by total collection methods. Total collections was conducted for a 7-day period for sheep and 5-day period for cattle and buffalo, following at least 2-week feed adaptation period. Methane production was measured by the facemask method equipped with methane analyser (Horiba, Japan) for 10 minutes at 3-hour intervals for 2 days immediately after the total collection ended. This methane production was then converted to daily total production.

The results showed that metabolisable energy of Indonesia indigenous sheep, swamp buffalo, Grade Ongole cattle and Grade Ongole-Limousin Crossbred were 78.0, 74.1, 72.5 and 74.3% of DE. The value of ME was less than 80% that was recommended by Agricultural Research Council (1980), or 82% as recommended by Japanese Feeding Standart (AFFRCS, 1999). It was considered that metabolism process in hot and humid areas such as Indonesia was less efficient as compared with that in the sub-tropics.

Key words: *DE, ME, buffalo, cattle, sheep.*

I. INTRODUCTION

The poor feeding management is one of several factors cause low animal production in Indonesia. Animal production system in Indonesia is almost running on the system without calculated feeding management since the tables of feed requirements for Indonesian livestock is not available yet. Mostly, people determine feeding regimes for animal based on table of animal requirement provided by NRC, Kearl or Ranjhan generated from studies on livestock type in more temperate climates. The only standard that can be used for determining feeding management is table composition of Indonesian feedstuff provided by Hartadi *et al* (1990). This table gives the value of total digestible nutrients (TDN) of each feedstuff. However, feeding management based on TDN value does not guarantee the animal performance, because there is metabolism process after digestion process. Animal production in form of body gain, or milk yield comes from the rest of nutrient metabolised after used for maintenance.

The requirement of feed for maintenance in cows represent a major input, accounting for approximately 50% of the total feed energy required for beef production (Ferrell and Jenkins, 1984), or 70% of metabolisable energy (Ferrell and Jenkins, 1987), and will be higher (more than 90%) for breeding bulls. Quantitative feed requirements for maintenance of beef cows are dependent on factors such as physiological age, body weight, level of milk production, proportion of offal tissue, breed, and environment (Ferrell and Jenkins, 1984; NRC, 1996). The metabolisable energy (ME) can be predicted by multiplying digestible energy (DE) by 0.8 (ARC, 1980), but it can vary considerably from 0.81 to 0.86 of DE (AFRC, 1993; AFFRCS, 1995, 1999). Therefore, the knowledge of ME and it requirement is important for successful management of beef cattle.

The lack of ME data in Indonesian indigenous livestock may be resulted by expensiveness of ME measurement, because it requires total collection of urine and methane production, as well as feed and faeces. One method for determining ME is by knowing the ME /DE ratio. Therefore, this study was carried out to estimate ME from DE in Indonesian cattle, buffalo and sheep.

II. MATERIALS AND METHODS

A total of 100 data of energy balance trials from Indonesian livestock, composed of 36 data from indigenous sheep, 24 data from swamp buffaloes, 12 data from Grade Ongole-Limousin Crossbred cattle, and 28 data from Grade Ongole cattle were used to study the proportion of metabolisable energy (ME) from digestible energy (DE). These data were obtained from 14 balance trials of various feeding treatments. At these experiments the animal was allowed to fulfil the dry matter requirement at level 4% body weight for sheep and 3%BW for cattle and buffalo, respectively. Digestible and metabolisable energy was obtained from energy balance trials by measuring gross energy intake, energy loss in form of faeces, urine and methane by total collection methods. This method was conducted for a 7-day period for sheep and 5-day period for cattle and buffalo, following at least 2-week feed adaptation period. The collection for cattle and buffalo was done by fitting to harnesses equipped with bags that collected the feces and urine, while for sheep the collection was done by using metabolism crates. Samples of feed, faeces and urine collected from balance trials were analysed for the energy content by bomb calorimeter.

Methane production was measured by the facemask method as described previously (Purnomoadi et al., 2003), equipped with methane analyser (Horiba, Japan) for 10 minutes at 3-hour intervals for 2 days, immediately after the total collection ended. This methane production was then converted to daily total production. The data of ME than were correlated to DE to meet the ratio of ME/DE.

III. RESULTS AND DISCUSSION

The data used in this study is presented in Table 1. The ranges of DE and ME of these four Indonesian indigenous livestock were wide due to the wide range of animal's body weight, physiological age, feeding regimes used and their production (gain) in these experiments.

Table 1. The range and mean of bodyweight (BW), digestible energy (DE), metabolisable energy (ME) and percentage of ME to DE of Indonesian livestock.

	BW, kg		DE, MJ/d		ME, MJ/d		ME/DE, %	
	range	mean	Range	mean	range	mean	range	mean
Grade Ongole	71-263	140	41.9-79.0	56.6	24.6-66.6	42.3	43.6-84.3	74.3
Ongole-Limousin	70-316	162	40.8-71.7	56.4	29.7-56.3	41.4	54.6-84.1	72.5
Buffalo	133-203	160	11.2-56.9	33.8	7.2-48.6	25.6	57.0-85.9	74.1
Sheep	19.2-26.3	22.9	3.2-18.2	9.4	1.8-15.9	7.5	54.6-89.9	78.0

The ME/DE ratio of sheep was found 0.78, the highest, while cattle and buffalo was stand similarly in range of 0.72-0.74. The results of this study, along with previous research, indicate that breed vary in efficiency (Reid et al., 1991). Those values were lower than 80% that was reported by Agricultural Research Council (1980), or 82% as recommended by Japanese Feeding Standard (AFFRCS, 1995, 1999). It was considered that metabolism process in hot and humid areas like Indonesia was less efficient as compared with that in the sub-tropics.

Based on the value of ME/DE ratio, the cattle of Grade Ongole crossbred (0.74) was slightly more efficient than of Grade Ongole-Limousin cattle (0.72). This can be pointed to the higher activity to balance the energy, such as thermoregulation process in cattle Grade Ongole-Limousin. This cattle is bred from Bos taurus (Limousin) and Bos indicus (Ongole), so their resistance to high temperature and humidity was lower than of Grade Ongole cattle (Bos indicus). Meanwhile, the buffalo showed similar efficiency with Grade Ongole cattle, while sheep was the most efficient in DE utilisation among other ruminants.

Correlation between digestible energy and ME/DE ratio is presented in Figure 1. Both buffalo and Grade Ongole cattle showed a similar trend that the ME/DE ratio increased in higher DE. This condition indicated efficiency on DE utilisation would be higher in higher intake of DE.

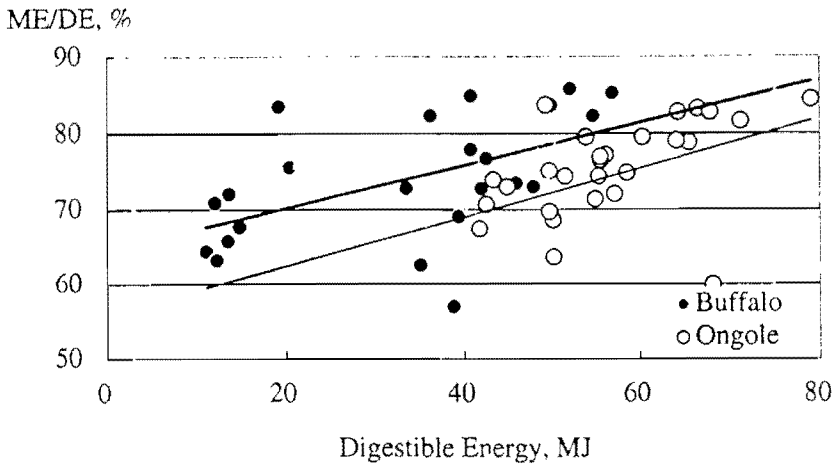

Figure 1. Correlation between digestible energy (MJ) to ME/DE (%) in buffalo and cattle

Implication of these results is that better animal production should be based on feeding management to maximise the digestible energy intake. Moreover, since animal in the tropical condition required higher nutrient intake whilst the feed consumption tend to decreasing, the high concentration of diet should be given in order to obtain the efficiency.

IV. ACKNOWLEDGEMENTS

The authors thank to the member of POTONGMANIA year 2002-2005, for assisting the experiments.

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