

Cassava pulp is suitable as a feed for beef cattle and shows less variation of its chemical contents among season and factories

Around a half the cassava (*Manihot esculenta*), one of major crops in Thailand, is produced in northeastern region. Cassava pulp, major waste produced from starch factory, is considered to be nutritious feed for cattle because of its high starch and fiber contents. To promote cassava pulp utilization as cattle feed, variations of chemical composition among season and starch factories, energy value, and performance of beef cattle fed cassava pulp were investigated.

Cassava pulp samples were collected in each season, the rainy season (mid-May to mid-October), summer (mid-October to mid-February), and winter (mid-February to mid-May), from four starch factories located in northeastern Thailand. Significant variations of phosphorous and potassium contents were found among factories (Table 1). Constant variation of any chemical components was not found among three seasons. Crude protein content of cassava pulp was close to that of cassava chip. Energy values, obtained from in vivo feeding trial using four Thai native cattle fed basal diet or basal diet with cassava pulp at maintenance level, were close to that of dried brewers' grain.

Eighteen yearling Thai native cattle were allocated to one of three dietary treatments and fed ad libitum for 5 months in a randomized complete block design. Three dietary treatments using different proportions of cassava pulp (10, 30 and 50% as dry matter) instead of rice straw as a base in a fermented total mixed ration were applied (Table 2). The diets were formulated to contain 10% crude protein and to be exceed their energy requirement. Metabolized energy content and daily weight gain increased with increasing cassava pulp content (Fig. 1).

Those results provide useful information on beef cattle rearing using cassava pulp and contribute to promote utilization of waste (cassava pulp) from cassava factories. Cassava pulp should be used as soon as possible or kept under anaerobic condition because of its low aerobic stability. It is necessary to note physical effective fiber content and nutrient requirements when diets are formulated with high ratio cassava pulp.

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Table 1. Chemical composition and energy values of cassava pulp, cassava chip and dried brewers' grain

| | Cassava pulp | | Cassava chip ^s | Dried brewers' grain ^s |
|---------------------------------|-------------------|------|---------------------------|-----------------------------------|
| | Mean | SD | | |
| DM (%) | 18.4 | 3.9 | 89.8 | 91.3 |
| Crude Protein (%DM) | 2.2 | 0.5 | 2.3 | 25 |
| Ether extract (%DM) | 0.4 | 0.3 | 0.5 | 5.7 |
| Neutral detergent fiber (%DM) | 36.0 [†] | 5.1 | 10.1 | 50.7 |
| Non fibrous carbohydrate (%DM) | 59.3 [†] | 5.4 | 83.3 | 10.8 |
| Hydrocyanic acid (ppm DM) | 117 | 55 | - | - |
| Calcium (%DM) | 0.22 | 0.07 | 0.1 | 0.36 |
| Phosphorus (%DM) | 0.03 [†] | 0.01 | 0.1 | 0.47 |
| Potassium (%DM) | 0.36 [†] | 0.14 | 0.92 | 0.04 |
| Magnesium (%DM) | 0.09 | 0.02 | 0.09 | 0.23 |
| Total digestible nutrient (%DM) | 74.4 | 0.4 | 79 | 70 |
| Metabolized energy (MJ/kgDM) | 11.3 | 0.1 | 15.3 | 11.3 |

DM: dry matter, [†]significant difference among factories (P<0.05), [‡] interaction between factory and season (P<0.05), ^s Data obtained from Nutrient Requirements of Beef Cattle in Indochinese Peninsula (2010)

Table 2. Feed formula, chemical composition and energy value of fermented total mixed ration containing 10, 30 and 50% of cassava pulp (dry matter basis)

| Feed formula (DM basis) | Cassava pulp ratio | | |
|-------------------------------------|--------------------|-------------|-------------|
| | Low | Medium | High |
| Cassava pulp | 10.0 | 30.0 | 50.0 |
| Rice straw | 50.0 | 30.0 | 10.0 |
| Palm Kernel meal | 23.5 | 23.5 | 23.5 |
| Soybean meal | 5.0 | 5.0 | 5.0 |
| Rice bran | 10.0 | 10.0 | 10.0 |
| Urea | 0.5 | 0.5 | 0.5 |
| Vitamin & mineral premix | 1.0 | 1.0 | 1.0 |
| Chemical composition (%DM) | | | |
| Crude protein | 9.9 | 9.7 | 9.7 |
| Ether extract | 5.9 | 5.9 | 5.9 |
| Neutral detergent fiber | 63.2 | 53.6 | 45.2 |
| Non fibrous carbohydrate | 10.5 | 22.9 | 33.7 |
| Metabolized energy (MJ/kgDM) | 9.6 | 11.4 | 12.4 |

DM: dry matter

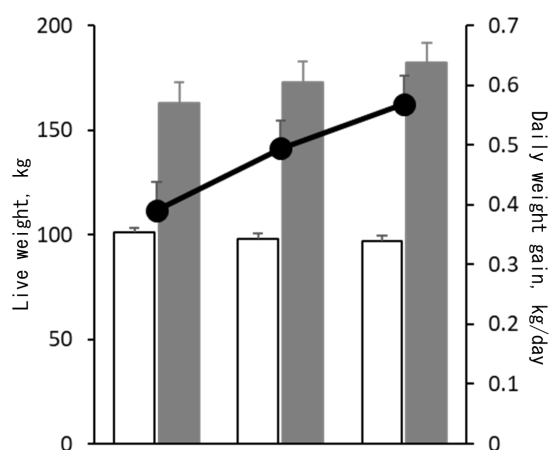


Fig. 1. Initial (□) and final (■) live weight, and daily weight gain (●) of Thai native cattle fed fermented total mixed ration containing 10, 30 and 50% of cassava pulp (dry matter basis). Daily weight gain linearly increased with increasing cassava pulp inclusion (P<0.05).