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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorpjn@gmail.com

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# Effects of Supplementation of Cassava Hay as Anthelmintics on Fecal Parasitic Egg in Swamp Buffalo Grazing on Ruzi Grass Pasture

Sittisak Khampa[1], Pala Chaowarat[1], Rungson Singhaler[2] and Metha Wanapat[3]
[1]Faculty of Agricultural Technology, [2]Faculty of Humanities and Social Sciences,
Rajabhat Maha Sarakham University, P.O. Box 44000, Thailand
[3]Tropical Feed Resources Research and Development Center (TROFREC),
Department of Animal Science, Faculty of Agriculture, Khon Kaen University,
P.O. Box 40002, Thailand

**Abstract:** Six, one-year old male swamp buffaloes with initial body weight at 200±10 kg were randomly divided into two groups according to receive concentrate at 14% CP (1 kg/head/day) + Ivermectin ($T_1$); cassava hay ($T_2$) (1 kg/head/day) and means were compared using t-test. All animals were grazing on ruzi grass pasture. The results have revealed that supplementation of cassava hay as anthelmintics replace ivermectin was non significant affected to fecal parasitic egg counts and average daily gain in buffaloes grazing on ruzi grass pasture ($p>0.05$). In addition, fecal parasitic egg counts dramatically declined for both treatment groups with 64.8 and 57.4%, respectively. However, Average Daily Gain (ADG) tended to be higher in swamp buffaloes fed on groups cassava hay ($T_2$) treatments than in those fed concentrate + ivermectin. However, digestion of coefficients of nutrients particularly organic matter was significantly higher in $T_2$ than those in $T_1$. It was, hence concluded that cassava hay could not only provide as a protein source but also high efficiency serve as an anthelmintics in swam buffaloes.

**Key words:** Cassava hay, fecal parasitic egg counts, anthelmintics, swamp buffalo

## INTRODUCTION

Internal parasites in ruminants raised in the tropics have been found to be one of the big constraints, apart from feed availability. Furthermore, using commercial drenching could result in high cost of production. Studies using feeds containing condensed tannins have been shown to reduce internal parasitic egg counts in cattle, buffaloes, sheep and goats (Wanapat, 2000; Netpana *et al*., 2001). Control of Gastro-Intestinal (GI) use of term parasite late on nematodes has relied heavily on the use of anthelmintics (Wanapat and Kahmap, 2006; Granum *et al*., 2007). These compounds have been used successfully but the development of anthelmintic resistance in GI nematodes (Geerts and Dorny, 1996) gives a clear indication that control programs based on use of anthelmintics are not sustainable. The objective of this experiment was conducted to determine the effects of supplementation of cassava hay as anthelmintic replace antibiotics on fecal parasitic egg counts and average daily gain in swam buffaloes grazing on ruzi grass pasture.

## MATERIALS AND METHODS

**Animals, diets and experimental design:** Six, one-year old of male swamp buffaloes weighing about 200±10 kg were randomly divided into two groups according to receive 2 groups of supplemental feeds by receive concentrate at 14% CP (1 kg/head/day) + Ivermectin ($T_1$) and cassava hay ($T_2$) (1 kg/head/day). During the first two weeks, animals had no supplements and grazed on ruzi grass pasture when fecal samples were analyzed for parasitic egg counts as a control. Following this period animals (3 each/group) were assigned to receive respective treatments by receiving concentrate at 14% CP and drenching with ivermectin ($T_1$) and cassava hay ($T_2$) (Table 1, 2) while grazing on ruzi grass pasture.

Feeds and fecal samples were collected at the end of each week for 6 weeks to be analyzed for chemical compositions (feed and feces) and fresh feces to be analyzed parasitic egg counts (Zajac, 1994). Composites samples were dried at 60°C and ground (1 mm screen using Cyclotech Mill, Tecator, Sweden) and then analyzed for DM, ether extract, ash and CP content (AOAC, 1985), NDF, ADF and ADL (Goering and Van Soest, 1970). In addition, digestion coefficients were calculated using Acid Insoluble Ash (AIA) as internal indicator from all feeds and excreted faces or rectal sampling according to Van Keulen and Young (1977).

**Statistic analysis:** The means of each parameter measured in the digestibility studies and internal parasitic egg counts were analyzed by the analysis of variance procedure of SAS (1998) and means were compared using t-test.

## RESULTS AND DISCUSSION

**Chemical composition of feeds and digestibility of nutrients:** The chemical compositions of concentrate diets, cassava hay and ruzi grass fed in swamp

Table 1: Ingredients of concentrate used in the experiment (%DM basis)

| Ingredients (%DM) | Concentrate |
|---|---|
| Cassava chip | 80.0 |
| Fine rice bran | 6.0 |
| Brewer's grain | 6.0 |
| Urea | 3.0 |
| Molasses | 3.0 |
| Sulfer | 0.5 |
| Salt | 0.5 |
| Mineral mix | 1.0 |

Table 2: Chemical composition of concentrate, cassava hay and Ruzi grass

| Analyzed composition (%) | Concentrate | Cassava hay | Ruzi grass |
|---|---|---|---|
| DM | 90.5 | 90.1 | 42.1 |
| OM | 91.2 | 91.2 | 89.6 |
| Ash | 8.7 | 9.3 | 10.6 |
| CP | 14.2 | 24.5 | 7.2 |
| NDF | 18.5 | 41.3 | 35.2 |
| ADF | 10.1 | 29.1 | 26.8 |
| CT | - | 3.4 | - |

DM = Dry Matter, CP = Crude Protein, OM = Organic Matter, NDF = Neutral Detergent Fiber, ADF = Acid Detergent Fiber, CT = Condensed Tannins

buffaloes are shown in Table 1 and 2. Crude proteins of concentrate, Cassava Hay (CH) and ruzi grass were 14.2, 24.5 and 7.2%, respectively. As compared between thetwogroupsfoundthatswamp buffaloes fed cassavahay ($T_2$) supplementationhad higher average daily gain and digestion coefficients especially that of OM than those fed concentrate + ivermectin ($T_1$) (221.7, 209.1 g/day and 74.6, 67.7%, respectively). These could be due to effect of supplemental cassava hay it contained good-quality protein with condensed tannins (Wanapat *et al*., 2000a, b; Hong *et al*., 2003).

**Effect on internal parasitic egg counts:** With regards to internal parasitic egg counts, during the first two weeks, the results were similar for all. As shown in Table 4 when treatments were imposed, parasitic egg counts in both groups started to decline from the first week to the last 6 week. The rates of decline were higher in concentrate + Ivermectin and the reduction were obtained at 64.8 and 57.4% for concentrate + Ivermectin ($T_1$) and cassava hay ($T_2$) groups, respectively. This lower rate of reduction $T_2$ could be attributed by lower amount of cassava hay (condensed tannins) consumed by animals as higher results were previously reported by Netpana *et al*. (2001) and Granum *et al*. (2007).

Condensed Tannin (CT) containing forages have the potential to help control anthelmintic resistant Gastro-Intestinal Parasites (GIP). The CT may have direct or indirect biological effects on the control of GIP. Butter *et al*. (2000) reported that direct effects might be mediated through CT nematode interactions, thereby affecting physiological functioning of GIP. Condensed tannins

Table 3: Effects of supplementation of cassava hay on feed intake, average daily gain (ADG) and digestibility of nutrients in swamp buffaloes grazing on ruzi grass pasture

| Item | $T_1$ | $T_2$ | p-value |
|---|---|---|---|
| **DM intake (kg/hd/day)** | | | |
| Concentrate | 1.0 | - | - |
| Cassava hay | - | 1.0 | - |
| ADG (g/day) | 209.1 | 221.7 | 0.1294 |
| **Apparent digestibility (%)** | | | |
| DM | 64.5 | 72.3 | 0.059 |
| OM | 67.7 | 74.6 | 0.018 |
| CP | 77.6 | 77.1 | 0.459 |
| NDF | 60.6 | 65.4 | 0.735 |
| ADF | 49.8 | 56.6 | 0.357 |

$T_1$ = Supplementation of concentrate at 14% CP (1 kg/head/day) + Ivermectin. $T_2$ = Supplementation of cassava hay (1 kg/head/day)

Table 4: Effects of supplementation of cassava hay on fecal parasitics egg in swamp buffaloes grazing on ruzi grass pasture

| Parasitic eggs/g of fresh feces | $T_1$ | $T_2$ | p-value |
|---|---|---|---|
| **Week-post feeding** | | | |
| -2 | 753.0 | 757.0 | 0.6297 |
| -1 | 761.0 | 758.0 | 0.6319 |
| 1 | 754.0 | 757.0 | 0.6129 |
| 2 | 648.0 | 689.0 | 0.2436 |
| 3 | 592.0 | 649.0 | 0.0942 |
| 4 | 414.0 | 508.0 | 0.0602 |
| 5 | 341.0 | 485.0 | 0.0623 |
| 6 | 322.0 | 402.0 | 0.1379 |
| 7 | 288.0 | 334.0 | 0.3495 |
| 8 | 257.0 | 325.0 | 0.0672 |
| Mean | 513.0 | 566.0 | 0.5450 |
| Reduction (%) | 64.8 | 57.4 | 0.0566 |

$T_1$ = Supplementation of concentrate at 14% CP (1 kg/head/day) + Ivermectin. $T_2$ = Supplementation of cassava hay (1 kg/head/day)

also may react directly by interfering with parasite egg hatching and development to infective stage larvae (Athanasiadou *et al*., 2000, 2001).

The findings of Sokerya and Rodriguez (2001) and Sokerya and Preston (2003) showed that Eggs per Gram (EPG) counted in goats fed the cassava and cassava + grass treatments steadily declined during the experiment from about 4000-5000 eggs/g of fresh feces in the first 30 days to about 1500 eggs/g after 70 days. Moreover, Hur *et al*. (2005) found that goat like eating fresh pine needles and dry oak leaves, these feedstuff could be used as an alternative method for controlling coccidian infection in goats in order to reduce a dependence on Chemotherapeutics as the sole method for controlling coccidian infection in goats.

Indirect effects on resistance and resilience could be mediated by changes in the supply of digested protein. The CT can improve protein nutrition by binding to plant proteins in the rumen so preventing microbial degradation and increasing amino acid flow to the duodenum. Protein supplementation appears to be

effective in enhancing specific immune responses against intestinal parasite infection (Bown *et al*., 1991). Nevertheless, this effect of CH supplementation should be noted since its effect was similar to using dewormers. It is therefore, concluded that cassava hay could be used as a protein source as well as an anthemintics to reduce internal parasitic egg counts especially with its easy use and availability by small-holder farmers in the tropics.

**Conclusion and Recommendations:** Based on these experiments, cassava hay containing condensed tannins and was used in various forms, could provide as a good source of protein, improve digestibility and reduce internal parasitic egg counts in swamp buffaloes. Cassava hay could be used successfully especially under small-holder farming system to sustain swamp buffaloes productivity and hence, recommended for use on farms.

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## REFERENCES

AOAC, 1985. Official Methods of Analysis. Association of Official Analysis Chemists, DC, USA.

Athanasiadou, S., I. Kyriazakis, F. Jackson and R.L. Coop, 2000. Effects of short-term exposure to condensed tannins on an adult *Trichostrongylus colubriformis*. Vet. Rec., 146: 728-732.

Athanasiadou, S., I. Kyriazakis, F. Jackson and R.L. Coop, 2001. Direct anthelmintic effects of condensed tannins towards different gastrointestinal nematodes of sheep: *in vitro* and *in vivo* studies. Vet. Parasitol., 99: 205-219.

Bown, M.D., D.P. Popp and A.R. Sykes, 1991. The effect of post-ruminal infusion of protein or energy on the pathophysiology of *Trichostrongylus colubriformis* infection and body composition in lambs. Aust. J. Agric. Res., 42: 253-267.

Butter, N.L., J.M. Dawson, D. Wakelin and P.J. Buttery, 2000. Effect of dietary tannin and protein concentration on nematode infection (*T. colubriformis*) in lambs. J. Agric. Sci., 134: 89-99.

Geerts, S. and P. Dorny, 1996. Anthelmintic resistance to helminths of animals and man in the tropics. Bulletin des Seande Academie Royale des Sciences d'Outre Mer., 41: 401-421.

Goering, H.K. and P.J. Van Soest, 1970. Forage Fiber Analysis (apparatus, reagent, procedures and some application). Agric. Handbook No. 379, ARS, USDA, Washington, D.C.

Granum, G., Wanapat, M., Pakdee, P., Wachirapakorn C. and W. Toburan, 2007. A Comparative Study on the Effect of Cassava Hay Supplementation in Swamp Buffaloes (*Bubalus bubalis*) and Cattle (*Bos indicus*). Asian-Aust. J. Anim. Sci., 20: 1389-1932.

Hong, N.T.T., M. Wanapat, C. Wachirapakorn, P. Pakdee and P. Rowlinson, 2003. Effect of timing of initial cutting and sequent cutting on yields and chemical compositions of cassava hay and its supplementation on lactating dairy cows. Asian-Aust. J. Anim. Sci., 16: 1763-1769.

Hur, S.N., A.L. Moland and J.O. Cha, 2005. Effects of feeding condensed tannin-containing plants on natural coccidian infection in goats. Asian-Aust. J. Anim. Sci., 18: 1262-1266.

Netpana, N., M. Wanapat and W. Toburan, 2001. Effect of condensed tannins in cassava hay on fecal parasitic egg counts in swam buffaloes and cattle. In: Proceeding of the international Workshop on Current Research and Development of cassava as animal feeds, organized by Khon Kaen University and Swedish International Development Agency (SAREC), July 23-24, Kosa Hotel, Thailand.

SAS, 1998. SAS/STAT User's Guide. Version 6.12. SAS Inc., Cary, NC, USA.

Sokerya, S. and L. Rodriguez, 2001. Foliage from cassava, *Flemingia macrophylla* and bananas compared with grasses as forage sources for goats: Effects on growth rate and intestinal nematodes. Livest. Res. Rural Dev., pp: 13.

Sokerya, S. and T.R. Preston, 2003. Effect of grass or cassava foliage on growth and nematode parasite infestation in goats fed low or high protein diets in confinement. MEKARN MSc, 2001-2003.

Van Keulen, J. and B.A. Young, 1977. Evaluation of acid insoluble ash as a neutral marker in ruminant digestibility studies. J. Anim. Sci., 44: 282-287.

Wanapat, M., 2000. Rumen manipulation to increase the efficient use of local feed resources and productivity of ruminants in the tropics. Asian-Aust. J. Anim. Sci., 13 (Suppl.): 59-67.

Wanapat, M. and S. Khampa, 2006. Effect of cassava hay in high-quality feed block as anthelmintics in steers grazing on ruzi grass. Asian-Aust. J. Anim. Sci., 19: 695-699.

Wanapat, M., A. Petlum and O. Pimpa, 2000a. Supplementation of cassava hay to replace concentrate use in lactating Holstein Friesian crossbreds. Asian-Aust. J. Anim. Sci., 13: 600-604.

Wanapat, M., T. Puramongkon and W. Siphuak, 2000b. Feeding of cassava hay for lactating dairy cows. Asian-Aust. J. Anim. Sci., 13: 478-482.

Zajac, A.M., 1994. Fecal examinationin the diagnosis of parasism. In: Veterinary College Press, Ames, Iowa.