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Effect of *Mikania micrantha* Kunth. Meal as protein source on the performance of growing large white Yorkshire pigs in Mizoram, India

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Abstract
The study was to evaluate the effect of feeding *Mikania micrantha* Kunth. (locally called *Japan hlo* in Mizoram) meal (MMM) on performance and feed efficiency of growing Large White Yorkshire (LWY) pigs under intensive rearing. Sixteen weaned LWY piglets (Ava. 20.10±3.24 to 20.63±3.75 kg body weight, 2-3 month of age) were assigned to four treatments with MMM at the rate of 0%, 5%, 10% and 15% as replacement of soyabean meal on equivalent protein basis. Feeding trail was conducted for 75 days. The digestibility trial was carried out for 5 days during the last week of feeding trial. There was linear decrease in feed intake with increased inclusion of MMM, but without any significant differences between the groups. Body weight changes were variable without any significant differences. Total gain in body weight was 36.38±1.19, 34.55±2.13, 33.35±2.43 and 32.83±1.29 kg, respectively for 0%, 5%, 10% and 15% MMM inclusion level. Digestibility co-efficient of nutrients decreased with increased inclusion of MMM. The feed efficiency was calculated as 3.07±0.30, 3.21±0.33, 3.16±0.28 and 3.14±0.34 for 0%, 5%, 10% and 15% MMM inclusion level. Considering the non-significant effect of MMM on growth, nutrient utilization and feed conversion efficiency, it was concluded that MMM could be included up to 15% level as protein source in place of soyabean meal for LWY pigs in Mizoram.

Keywords: *Mikania micrantha* (*Japan hlo*), growth, nutrient digestibility, feed conversion ratio, LWY

Introduction
Animal husbandry plays pivotal role for livelihood of rural farming communities in Mizoram for unprofitable agricultural practices due to geographical constraints. Amongst the livestock farming, piggery is the popular economic activity throughout the state and is one of the main sources of income for subsistence of the rural farmers. According to Livestock Census (2012), pig constitutes 69.33% of the total livestock population of the state followed by 9.95% cattle and 20.72% other livestock in the state. However, pig rearing system in Mizoram is of backyard type, and entirely different from other states of India. Feeding of pigs is characterized by extensive utilization of local vegetations, agro-wastes, and household and kitchen wastes [1]. This is because of non-availability of conventional feed ingredients at ease and very high prices of compounded pig rations in the local markets of Mizoram. The state has to depend on other neighbouring states for animal feeds. As feeding cost accounts for nearly 70-80% of total production cost of pig rearing, it compels the farmers to utilize the locally available unconventional feed-stuffs to reduce production cost and increase profit margin.
Amongst the different locally available feedstuffs [namely, Ankasa (*Spilanthus Sp.*), Vawkpui thal (*Bidens biternata*), Khup nal (*Hibiscus Sp.*), Japan Hlo (*Mikania micrantha* Kunth.), Buar (*Conyza auriculata*), Taham (*Polygonum chinensis*), Pumpkin, Bamboo shoots, Banana (pseudo-stem, leaves and green banana fingers), Colocasia (leaves stems and tubers), Sweet potato (leaves and tubers) and Tapioca (leaves and tubers) etc.], *Mikania micrantha* Kunth. i.e. *Japan hlo* is one of the commonly and extensively used unconventional feed by the pig farmers for its abundant availability and ease of collection in Mizoram [2]. The whole plant is cut into small pieces, mixed with other unconventional feeds and then boiled with kitchen waste/vegetable leftovers etc. before feeding to pigs.
Under the scientific feeding regime, protein ingredients are expensive and constitute major share of the cost involved for feed mixture. In this regard, *Mikania micrantha* Kunth. may be a promising alternative to the conventional protein feed ingredients as it contains 21.76% CP on dry matter basis [3] with good amino acid profile [4] in leaves.

Therefore, considering the importance economic feeding of pigs in Mizoram, the present study was conducted to evaluate the effects of feeding *Mikania micrantha* Kunth. Meal (MMM) as replacement of soyabean meal on equivalent protein basis on the performance and feed efficiency of growing LWY pigs under intensive rearing in Mizoram.

Fig 1: Show of tree

Materials and Methods

The study was carried out at the Instructional Livestock Farm Complex (ILFC) of College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, (Imphal), Selesih, Aizawl, Mizoram. The study was approved by Institutional Animal Ethics Committee constituted by the University.

Sixteen weaned pure breed LWY piglets (2-3 months of age, average body weight 20.10±3.24 to 20.63±3.75 kg) were selected from the herd maintained at ILFC Piggery, College of Veterinary Sciences & Animal Husbandry, Central Agricultural University, (Imphal), Selesih, Aizawl, Mizoram and were randomly divided into four treatment groups (MM-0, MM-5, MM-10 and MM-15) with four piglets in each group.

The *Mikania micrantha* Kunth. (Japan hlo), the whole plant, were collected from different places in and around Selesih, Aizawl, Mizoram, pooled together and sun-dried before milling to prepare MMM.

Four experimental rations were formulated [5] where MMM was incorporated at the rate of 0% (MM-0), 5% (MM-5), 10% (MM-10) and 15% (MM-15) level by replacing soyabean meal (SBM) at an amount on equivalent protein basis (Table 1).

Table 1: Composition of the experimental rations with MMM at varying levels

Ingredients	MM-0	MM-5	MM-10	MM-15
Maize	51	49.4	42.5	41.25
Rice Polish	20	18	22	20
Soyabean Meal	22	19.6	17.2	14.75
Fish Meal	4	5	5.3	6
Mineral Mixture	2.5	2.5	2.5	2.5
Common salt	0.5	0.5	0.5	0.5
MMM	0	5	10	15
Total	100	100	100	100

The experimental pigs were housed individually under intensive system of management. The feed was given individually and wholesome drinking water was made available at all the times. The feeding trial was conducted for 75 days with 10 days adaptation period at the start of the experiment.

The digestibility trial was conducted for 5 days during the last week of the feeding trial. For digestibility trial, three animals from each group were randomly selected. The individual feed intake, residue feed left and faeces voided by the animals were recorded. Two days adaptation period was given prior to sampling and collection. Representative samples of feed offered and residue feed left were collected for estimation of dry matter (DM) and samples were pooled for 5 days for chemical analysis. Faeces voided were weighed individually in previously weighed containers. The amount of faeces collected within 24 hours was quantified and representative sample was taken for aliquoting in the laboratory. A suitable aliquot of faeces was taken for DM estimation and stored in labelled air-tight containers for analysis. A separate aliquot of faeces mixed with sulphuric acid (1:4) was preserved for 5 days in wide-mouth stopper glass bottles for nitrogen estimation. The feed intake of the pigs was recorded individually throughout the experiment. Individual body weights of the pigs were recorded at weekly interval. The weekly feed conversion ratio (FCR) was calculated using the following formula.

FCR: [Weekly total feed consumption (kg)]/ [Weekly gain in body weight (kg)]

Proximate principles of the samples were analysed following methods of AOAC [6]. The data obtained during the study were statistically analysed following methods of Snedecor and Cochran [7].

Results and Discussion

Nutritional composition of the experimental rations

The DM% of the rations were 89.40, 89.60, 89.50 and 89.40 percent for MM-0, MM-5, MM-10 and MM-15, and the respective CP (%) and calculated energy values (Kcal ME/kg) were 18.06 and 3311; 10.08 and 3208; 18.07 and 3116 and 17.99 and 3014, respectively (Table 2).

Table 2: Nutritional composition (% DM basis) of the experimental rations

Nutrient	MM-0	MM-5	MM-10	MM-10
DM (%)	89.40	89.60	89.50	89.40
CP (%)	18.06	18.08	18.07	17.99
CF (%)	4.32	5.07	6.43	7.18
EE (%)	3.87	3.48	3.64	3.79
TA (%)	12.24	11.75	12.98	12.66
NFE (%)	61.51	61.62	58.88	58.38
OM (%)	87.76	88.25	87.02	87.34
*ME (kcal/kg)	3311	3208	3116	3014
*Lysine (%)	1.02	0.96	0.90	0.83
*Methionine (%)	0.38	0.36	0.36	0.34
* Calculated values.				

Feed consumption

Optimum feed intake is one of the important considerations in pork production because nutrient intake levels are directly related to voluntary feed intake of pigs [8]. Whereas, voluntary feed intake of pigs depends on the feed composition in terms of nutrient level and nutrient balance [9]. No significant

differences (P>0.05) were observed between the groups for daily feed intakes (kg/animal) throughout the feeding trial. However, as inclusion of MMM increased CF levels, this might be the reason for linear decrease of feed intakes in MM-5, MM-10 and MM-15. The insignificant effect might be for high protein (21.76% CP on DM basis) level and good amino acid profile of MMM. The average total feed intakes (kg/animal) were 112.32±13.53, 111.13±14.45, 105.77±13.74 and 104.13±14.96 kg, respectively for MM-0, MM-5, MM-10 and MM-15, and was statistically insignificant among the groups.

Growth performance

The primary goal of the pig farmers is to get maximum body weight at marketable age. Growth is directly related with nutrient content of feed offered to pigs and its digestibility. There was decrease in body weight with the increased inclusion of MMM in the ration. However, no significant (P>0.05) difference was observed between the groups. As digestibility of nutrients was comparatively less in MMM included groups (table 4), it might contribute to lower body weight at higher inclusion level. Besides high CF, MM was also known to contain anti-nutritional factors like tannins, saponins etc., which might also contribute to comparatively lower digestibility of nutrients and hence growth of the pigs.

Similar to weekly body weights, average daily gain (ADG) in body weight (kg) was also decreased with increased inclusion level of MMM in the ration, but without any significant differences (P>0.05) between the groups. Nguyen *et al.* [10] also reported similar findings for ensiled cassava leaves, dry cassava leaves, dry sweet potato vines or ensiled sweet potato vines in growing Vietnamese Large White × Mong Cai pigs, and by Saikia and Goswami [11] for cooked banana stem in crossbred (Large White Yorkshire X Hampshire) pigs.

Feed conversion ratio (FCR)

No significant differences were observed for FCR between the groups with different inclusion levels of MMM in the ration. However, FCR was variable and decreased with increased inclusion of MMM in the ration. The FCR at 75 days of feeding trial was calculated as 3.07±0.30, 3.21±0.33, 3.16±0.28 and 3.14±0.34 for MM-0, MM-5, MM-10 and MM-15, respectively (table 3). No significant (P>0.05) difference was observed between the groups. The feed cost per kg gain in body weight was calculated as Rs. 94.01, 93.20, 85.16 and 79.28 for MM-0, MM-5, MM-10 and MM-15 at the end of the feeding trial. Similarly, Lampheuy Kaensombath [12] also observed non-significant effect on FCR in Landrace X Yorkshire and ML (Moo Lath) pigs fed ration replacing soyabean crude protein with ensiled taro leaf and stylo forage.

Table 3: Performance parameters of growing LWY piglets fed MMM

Treatment	MM-0	MM-5	MM-10	MM-15	SEM	p-value
Initial body weight (kg)	20.20±3.52	20.63±3.75	20.10±3.24	20.45±4.21	1.66	1.000
Final body weight (kg)	56.57±4.35	55.18±5.10	53.45±4.93	53.28±5.47	2.26	0.960
Gain in body weight (kg)	36.38±1.19	34.55±2.13	33.35±2.43	32.83±1.29	0.89	0.553
Feed conversion ratio (FCR)	3.07±0.30	3.21±0.33	3.16±0.28	3.14±0.34	0.14	0.991
Total feed consumption (kg)	112.32±13.53	111.13±14.45	105.77±13.74	104.13±14.96	6.41	0.970
Feed cost/kg gain (Rs.)	94.01	93.20	85.16	79.28	4.21	0.603

Digestibility of nutrients

No significant difference was observed for nutrient digestibility among the groups. However, digestibility co-efficient of nutrients decreased with increased inclusion of MMM in the ration. Anti-nutritional factors present in MM might contribute to comparatively lower digestibility in MMM included groups than the control (table 4). Halimani *et al.* [13] also observed decreasing trend in nutrient digestibility in LWY pigs fed with *Acacia karroo*, *Acacia nilotica* and *Colophospermum mopane* leaf meals.

Table 4: Nutrient digestibility in growing LWY pigs fed MMM based ration

Nutrient	MM-0	MM-5	MM-10	MM-15	SEM	p-value
DM	74.40±0.67	74.04±0.73	73.59±0.79	72.81±0.82	0.38	0.488
CP	75.56±1.07	74.69±1.16	75.29±1.45	74.01±0.92	0.57	0.791
CF	57.87±0.89	58.52±1.01	57.41±1.39	56.84±0.95	0.53	0.733
EE	81.54±1.23	79.29±1.28	81.32±2.75	78.34±1.60	0.91	0.536

Mortality

No mortality was recorded in different treatment groups with and without inclusion of MMM in the ration.

Conclusion

It was concluded that MMM could be included up to 15% level as replacement of soyabean meal on equivalent protein basis in the ration of growing LWY pigs as it has no adverse effects on growth, nutrient utilization, and feed efficiency.

References

1. Kumaresan A, Pathak KA, Bujarbaruah KM, Das A. Swine Production in Mizoram, ICAR Research Complex for NEH Region, Mizoram Centre, Kolasib, Mizoram, 2006.
2. Buragohain R. Nutritional status of growing-finishing pigs under rural feeding management in Mizoram. Indian Journal of Animal Nutrition. 2012; 29(3):287-290.
3. Buragohain R. Rations for pigs with unconventional feedstuffs under rural production System in Mizoram. Indian Veterinary Journal. 2013; 90(4):59-63.
4. Hock-Hin Yeoh, Yeow-Chin Wee, Leslie Watson. Leaf Protein Contents and Amino Acid Patterns of Dicotyledonous Plants. Biochemical Systematics and Ecology. 1992; 20(7):657-663.
5. NRC. Nutrient Requirement of Swine (10th Edition), National Research Council, National Academy Press, Washington DC, 1998.
6. AOAC. Official Methods of Analysis of AOAC International, 16th edition, Arlington, Virginia, USA, 1995, 2.
7. Snedecor GW, Cochran WG. Statistical Methods, 1st East-West Press ed., Affiliated East-West Private Ltd. New Delhi, 1994.
8. Nyachoti CM, Zijlstra RT, De Lange CFM, Patience JF. Voluntary feed intake in growing-finishing pigs: A review of the main determining factors and potential approaches for accurate predictions. Canadian Journal of Animal Science. 2004; 84(4):549-566.

9. Zijlstra Ruurd T, Martin Nyachoti C, Tom A. Scot, Lee Whittington D, Harold W. Gonyou, John F. Patience. Factors that influence voluntary feed intake. Annual Research Report, 1999, 14-16. (Retrieved from http://www.prairieswine.com/pdf/1897.pdf).
10. Nguyen THL, Ngoan LD, Verstegen MWA, Hendriks WH. Ensiled and Dry Cassava Leaves, and Sweet Potato Vines as a Protein Source in Diets for Growing Vietnamese Large White× Mong Cai Pigs. Asian-Aust. J Anim. Sci. 2010; 23(9):1205-1212.
11. Saikia G, Goswami BK. Banana stem in the finisher ration of pigs. Indian Journal of Animal Nutrition. 2004; 21(1):63-64.
12. Kaensombath L. Taro Leaf and Stylo Forage as Protein Sources for Pigs in Laos. Doctoral Thesis, Submitted to Swedish University of Agricultural Sciences, 2012.
13. Halimani TE, Ndlovu LR, Dzama K, Chimonyo M, Miller BG. Growth performance of pigs fed on diets containing *Acacia karroo*, *Acacia nilotica* and *Colophospermum mopane* leaf meals. Livestock Research for Rural Development. 2007, 19. (Retrieved August 2, 2019, from http://www.lrrd.org/lrrd19/12/hali19187.htm).