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# Chemical composition of feed resources in Bihar

A DEY[1], S K BARARI[2] and B P BHATT[3]

*ICAR Research Complex for Eastern Region, Patna, Bihar 800 014 India*

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ABSTRACT

Feeding system of livestock depends on the availability of crop residues and by-products and pasture and grasses on common property resources. The present work was, therefore, taken up to assess the proximate compositions of commonly available feed stuffs in Bihar. Feed samples were collected from 40 households of 4 villages of north Bihar and 40 households of four villages of south Bihar. The average DM content of cereal crop as well as the leguminous crop residues varied between 89 and 93%. The chemical compositions of cereal crop residues revealed that the CP content was very low varied between 2.9 and 3.4% while fibre content was very high and varied between 32 and 37%. The CP content in grain and pulses used for feeding of livestock varied from 8 to 18% with highest value in gram flour. The wheat and rice bran and pulses *chunies* constitute the larger part of the dairy ration. The chemical composition of pulses *chunies* and bran depicts that they contained 14 to 15 and 10 to 14% CP, respectively. Horticulture waste contains 5 to 19% CP and 2 to 4% EE. Three types of oil-cakes are used for feeding livestock. All over the state, mustard cake is used as primary source of protein. Linseed-cake is only used for feeding dairy cow and buffalo. The chemical compositions revealed that the oil-cakes contained 31 to 33% protein and 3 to 8% EE. The present study revealed that available fodder resources had good nutritional values. However, energy values and mineral contents of feed resources have to be worked out for better understanding of nutrients intake.

**Key words**: Chemical composition, Crop by-products, Grain, Oil-cake, Straw, Tree leaves

In Bihar, feed resources for livestock have not been documented so far. As a result nutritional status of livestock particularly dairy animals could not be assessed. Examination of available literature showed that existing feeding practices could not support the nutritional requirement of livestock (Singh 1994, Ahuja *et al.* 1995, Hoque *et al.* 2004, Paul *et al.* 2010). So, it is the need of time that chemical compositions of different feeds are assessed and nutritional strategies are determined. The present work was, therefore, taken up during 2008–10 to assess the proximate compositions of commonly available feed stuffs in Bihar.

## MATERIALS AND METHODS

Bihar is divided into 2 by the river Ganges i.e. north and south Bihar. For the collection of feed resources 2 districts from each half were selected. Accordingly, Muzaffarpur and Daarbhanga districts from north Bihar, and Patna and Bhojpur districts from south Bihar were selected. From each district, 2 villages were selected randomly. Feed samples were collected from 40 households of 4 villages of north Bihar and 40 households of 4 villages of south Bihar. The samples of each feed collected from each district were pooled, grinded through 1 mm sieve and analysed for proximate principles (AOAC 1995).

Present address: [1]Head (amitavdey_icar@yahoo.co.in), [2]Chief Technical Officer (skbarari@yahoo.co.in), [3]Director (drbpbhatt.icar@yahoo.com).

## RESULTS AND DISCUSSION

The proximate compositions of feed resources and common names are presented in Table 1. All most all crop residues and by-products, low quality grains, tree leaves, horticultural wastes, aquatic plants, cultivated fodder crops and natural pasture are used for feeding livestock particularly the dairy animals. The average DM content of cereal crop as well as the leguminous crop residues varied from 89 to 93%. Since, these residues were collected after grain is harvested and dried in the sun, the DM content was higher and can be stored for feeding in future. The DM content of grains varied from 88 to 93% while values for crop by-products varied from 89 to 91%. However, the DM content of horticultural waste, tree leaves and other feed ingredients like sugarcane tops, local grasses and molasses was observed low (11–46%), among which horticultural wastes had the lowest DM (11–27%).

The chemical compositions of cereal crop residues revealed that the CP content was very low varying from 2.9 to 3.4% while fibre content was very high varying from 32 to 37%. The EE content was also below 1%. The OM content of crop residues varied from 82 to 94% with highest

value in maize cobs and lowest in paddy straw. The chemical compositions are in close agreement with the results of Singh and Schiere (1993), Saha *et al.* (1997) and Ranjhan (1998).

The chemical compositions of leguminous crop residues (*bhusa* and dried plants) indicate that they contained fairly good amount of CP varying from 5 to 13% while pods of oilseed contain 12% CP. The EE content of leguminous *bhusa* and pods was less than 2% except for mustard where EE content was observed as 3.4% due to content of seed in the pods. The CF content of leguminous *bhusa* and pods varied from 28 to 40%. The chemical compositions are in close agreement with the values reported by Saha *et al.* (1997) for eastern and north-eastern regions. The chemical

Table 1. Chemical compositions of feed resources (% DM basis) in Bihar

| Feed | DM | CP | CF | EE | OM |
|---|---|---|---|---|---|
| *Crop residue* | | | | | |
| Paddy straw | 88.91±1.42 | 3.34±0.27 | 34.40±0.81 | 0.79±0.02 | 82.32±1.07 |
| Wheat straw | 91.88±1.79 | 3.26±0.12 | 32.27±8.23 | 0.98±0.06 | 89.04±1.15 |
| Maize stover | 93.10±2.22 | 3.24±0.44 | 33.17±1.92 | 0.85±0.07 | 90.86±1.54 |
| Maize cobs | 92.89±2.14 | 2.94±0.47 | 36.80±0.47 | 0.75±0.19 | 94.17±1.52 |
| Lentil *bhusa* | 91.76±2.56 | 8.10±1.62 | 35.95±6.47 | 1.24±0.32 | 83.25±5.41 |
| Gram *bhusa* | 90.60±0.12 | 8.48±1.51 | 39.50±2.17 | 1.14±0.32 | 89.77±0.57 |
| Mustard *bhusa* | 92.78±2.65 | 4.68±1.18 | 41.50±3.67 | 1.31±0.09 | 90.24±0.62 |
| Mung *bhusa* | 91.60±2.66 | 10.65±1.02 | 28.68±1.33 | 1.55±0.50 | 86.49±0.28 |
| *Urd bhusa* | 91.78±1.54 | 9.50±0.15 | 27.20±0.20 | 0.78±1.06 | 90.70±1.78 |
| *Arhar bhusa* | 90.45±2.51 | 13.05±0.53 | 37.88±0.93 | 1.90±0.21 | 95.60±0.07 |
| Dried pea plant | 89.10±2.46 | 7.10±1.12 | 32.60±0.56 | 1.80±0.08 | 93.20±1.08 |
| Dried cowpea plant | 86.44±1.86 | 9.80±0.82 | 28.50±1.04 | 1.40±0.08 | 87.30±1.22 |
| *Arhar* pods | 90.65±2.22 | 6.22±0.24 | 33.65±1.08 | 0.98±0.88 | 91.22±1.56 |
| Gram pods | 91.76±3.21 | 4.60±0.87 | 39.20±0.43 | 1.40±0.08 | 89.22±2.41 |
| Mustard pods | 92.54±2.32 | 12.14±1.11 | 38.90±2.76 | 3.70±0.14 | 87.96±0.78 |
| *Grains* | | | | | |
| Wheat | 93.28±0.58 | 9.34±0.31 | 5.03±0.75 | 2.88±0.23 | 92.25±3.36 |
| Rice grit | 92.82±1.76 | 8.38±0.41 | 1.10±0.14 | 1.00±0.14 | 97.95±0.46 |
| Maize | 88.40±0.21 | 9.77±0.24 | 2.39±0.06 | 1.75±0.43 | 94.90±2.47 |
| Gram flour | 90.16±1.22 | 18.20±0.08 | 9.80±0.14 | 3.50±1.10 | 88.70±2.42 |
| *Crop by-products* | | | | | |
| Gram *chunnies* | 92.76±2.42 | 13.85±0.53 | 26.36±9.80 | 2.08±0.15 | 94.20±0.63 |
| Lentil *chunnies* | 90.24±1.88 | 14.74±1.22 | 28.33±0.56 | 1.61±0.66 | 91.22±1.24 |
| Wheat bran | 89.95±1.49 | 14.67±0.17 | 11.21±1.09 | 3.50±0.45 | 91.64±1.52 |
| Rice bran | 90.38±1.54 | 9.88±0.93 | 23.01±2.74 | 6.94±1.14 | 83.52±1.98 |
| Rice polish | 90.80±3.46 | 13.52±0.65 | 6.65±0.39 | 13.65±1.10 | 90.42±0.02 |
| Deoiled rice bran | 90.20±3.20 | 15.32±0.51 | 17.48±3.48 | 0.68±0.19 | 77.59±0.57 |
| *Arhar chuni* | 89.30±1.56 | 15.15±0.53 | 24.66±2.19 | 1.45±0.11 | 88.92±0.39 |
| *Urd chuni* | 87.30±2.31 | 14.05±1.10 | 21.85±1.87 | 0.85±0.04 | 80.04±0.82 |
| *Mung chuni* | 90.20±1.66 | 14.50±0.78 | 24.87±0.22 | 2.70±1.20 | 92.40±1.68 |
| *Oil cakes* | | | | | |
| Mustard cake | 89.88±2.80 | 30.80±1.47 | 9.96±0.85 | 8.33±0.32 | 84.14±3.15 |
| Linseed cake | 90.22±2.65 | 32.68±0.69 | 8.65±0.39 | 3.32±0.86 | 91.50±0.21 |
| Til cake | 91.30±3.12 | 31.56±2.12 | 6.70±0.35 | 5.50±1.83 | 82.06±2.61 |
| *Horticultural waste* | | | | | |
| Banana plants | 14.76±4.12 | 5.10±1.22 | 14.50±1.87 | 1.70±0.56 | 86.50±1.77 |
| Cabbage waste | 10.80±4.12 | 19.30±1.34 | 7.20±1.48 | 3.70±0.71 | 83.65±4.13 |
| Cauliflower waste | 27.42±3.23 | 15.30±1.43 | 10.20±2.11 | 3.10±0.34 | 87.40±1.56 |
| *Tree leaves* | | | | | |
| Bamboo leaves | 46.05±0.18 | 11.94±0.68 | 27.00±1.34 | 1.84±0.09 | 87.30±0.28 |
| Mango leaves | 34.70±2.56 | 8.70±1.20 | 24.60±2.56 | 2.60±0.33 | 88.20±1.67 |
| Jackfruit leaves | 29.80±3.22 | 10.50±1.08 | 24.90±2.22 | 2.20±0.06 | 89.40±0.89 |
| *Siris* leaves | 26.25±0.25 | 21.70±0.49 | 33.50±0.77 | 2.85±0.18 | 91.92±0.37 |
| *Peepal* leaves | 41.75±1.66 | 13.72±0.48 | 15.89±0.77 | 4.70±0.28 | 86.69±0.27 |
| *Pakar* leaves | 25.70±0.77 | 16.04±0.18 | 14.66±0.32 | 5.85±0.39 | 91.95±0.11 |
| *Other feed* | | | | | |
| Sugarcane tops | 37.43±6.66 | 5.04±0.72 | 32.98±1.86 | 2.70±0.98 | 92.40±1.54 |
| Molasses | 65.66±3.21 | 3.83±0.52 | - 11.10±0.40 | 83.74±3.09 | |
| Local grass | 34.50±3.67 | 8.46±0.78 | 27.43±1.22 | 1.70±0.08 | 87.90±1.98 |

composition of *arhar* straw was in close agreement with the values reported by Bhadane *et al.* (2004) and gram straw with the values reported by Dhuria *et al.* (2004).

The values for CP content in grain and pulses used for feeding of livestock varied from 8 to 18% with highest value in gram flour. The EE content of these kinds of feeds varied from 1 to 3.5%. However, the CF content was as low as 1.1% in rice and as high as 9.8% in gram. The values corroborate with the results of Saha *et al.* (1997) and Ranjhan (1998). The chemical compositions of maize grain is in close agreement with the values reported by Singh and Kundu (2003) while content of CP in Bengal gram was slight higher than the present value.

The wheat and rice bran and pulses *chunies* constitute the larger part of the dairy ration. The chemical composition of pulses *chunies* and bran depicts that they contained 14–15 and 10–14% CP, 0.6–2 and 3.5–13% EE and 21–26 and 7–23% CF, respectively. The values corroborates with the results of Saha *et al.* (1997), Ranjhan (1998) and Singh and Kundu (2003).

Three types of oilcakes are used for feeding livestock. All over the state, mustard-cake is used as primary source of protein. Linseed-cake is only used for feeding dairy cow and buffalo. Use of *til*-cake is very less and mainly confined to Chhapra district. The chemical composition revealed that the oil cakes contain 31–33% protein and 3–8% EE. The values are in close agreement with the results of Saha *et al.* (1997) and Ranjhan (1998). The CP content of mustard-cake was lower but CP content of linseed-cake was comparable with the values reported by Singh and Kundu (2003).

Leaves of *peepal, siris, pakar*, mango and jackfruits are popularly used for feeding small ruminants. Bamboo leaves are popularly used for feeding large ruminants particularly during scarcity period. The tree leaves also had fairly good amount of protein varying from 9 to 22%. However, anti-nutritional factor limits the use of tree leaves as fodder for dairy animals but used extensively for feeding small ruminants. The chemical compositions of tree leaves are in close agreement with the values reported by Khan *et al.* (2008). The chemical composition of *peepal* leaves, jackfruit leaves and bamboo leaves with Shekhawat and Murdia (2000), Das and Ghosh (2001) and Rajebbosale *et al.* (1998).

Horticultural wastes are also commonly used for feeding livestock. Horticultural waste contains 5–19% CP and 2–4% EE. The compositions are closely similar to the values reported by Dutt *et al.* (2008). Among other feed ingredients sugarcane tops are extensively used for feeding livestock. On an average it contained 5% CP and 3% EE. The values are in close agreement with the values reported by Patil *et al*. (1999). Molasses is also used for feeding dairy animals particularly after parturition. It contained 4% CP and 11% EE. The compositions are almost similar with the values reported by Saha *et al.* (1997). Pasture and local grasses collected from common property resources, wasteland and bunds, contained 8–12% CP and about 1% EE. These constitute the main fodder for livestock maintained by landless labourers.

It may be concluded that available fodder resources have good nutritional values as compared to other states in India and can be utilized for livestock feeding. However, energy values and mineral contents of feed resources have to be worked out for better understanding of nutrients intake.

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