

## Nutritional Evaluation in Six New Variety Breeder Seeds of *Pisum sativum*

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Biological evaluation is an essential step in the nutritional studies besides the quantitative estimation of proteins in food stuffs. Proteins present in various food stuffs accounts for their nutritive value. On account of different amino acid composition, due to presence on various anti nutritive factors, the nutritional quality may be reduced. The intake and utilization of food are directly correlated to growth production, repair, maintenance, resistance to diseases and all other biological process occurring in animals. The primary purpose of dietary proteins is to fulfill the protein requirement of the body and the biological evaluation of dietary proteins is the essential step in nutritional evaluation. Hence In this study new variety breeder seeds (Arkel, Pusa pragati, IPF-99-25, JP-885, MM-15 and JM-6) of *Pisum sativum* are studied for nutritional studies by feeding on white albino rats.

**Key Words:** Biological evaluation, Dietary proteins, Anti nutritive factors.

### INTRODUCTION

Chemical procedure has the draw back of ignoring biological availability of essential amino acids, digestibility effects role of non specific amino acids role of toxic materials. The nutritional quality of a protein is determined by the quantity, availability and proportion of essential amino acids. Bioassays measure the efficiency of the biological utilization of dietary protein as source of the essential amino acids under a set of standardization condition. Many biological methods based on effects of the quality and amount of dietary protein on growth performance in young animals have been proposed for evaluating protein quality. Among these methods, the protein efficiency ratio (PER), based on weight changes of growing rats, is perhaps the most widely used. This method has been criticized by the several authors. One of its shortcomings is that no consideration is given to the requirements of protein for maintenance. To overcome this objection, the inclusion of a group of animals consuming a non-protein diet for a similar period of time was proposed and the procedure is called net protein ratio<sup>1</sup>. Laboratory work on young animals indicated that lack of protein or amino acids may reduce appetite, even if the diet provides adequate energy and nutrients for satisfactory growth<sup>2</sup>. Animal feeding trial are the standard procedure for detecting the anti-nutritional factors In such trial, it is necessary to the feed the substance at a relatively high in the diet for a period of several weeks.

Generally, when antinutrients are present, experimental animal will either reduce their feed intake, at high level of such toxins they may even refuse to eat the diet or will grow more slowly than expected in relation to the amount of food eaten. In the present study, A new variety, healthy and matured legume breeder seeds, Arkel, Pusa pragati, IPF-99-25, JP-885, MM-15 and JM-6 of *Pisum sativum*, under consideration are collected from Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur and were studied for their Nutritive value by feeding on white Albino rats.

### EXPERIMENTAL

The present investigation has been planned to study the nutritive value of the seeds of *Pisum sativum* (Arkel, Pusa pragati, IPF-99-25, JP-885, MM-15 and JM-6) were determined by the feeding trials on the six weeks old male Albino rats.

Twenty one white Albino rats aged 6 weeks were randomly distributed to seven groups each having 3 rats. Rats selected were of body weight nearest to the mean of the population. They were housed in individual cages maintained in a well-ventilated room. Feed and water allowed *ad libitum*.

The composition of experimental diets fed to the rats is given in Table-1. The diets were iso-nitrogenous with *ca.* 25 % crude protein and iso-caloric with *ca.* 3000 kcal/kg. Adequate proportion of minerals and vitamins as recommended by ISI (565.4 part I-1970) for Albino rats were added. The seed meals used in the study were autoclaved for 0.5 h at 15 lb pressure<sup>3</sup> before being incorporated in the diets to destroy the anti-nutritive factors (cyanogenetic glycosides, tannins, trypsin inhibitors and haemagglutinins)<sup>4,5</sup>. Crude protein content and other proximate constituents are not affected by autoclaving<sup>6,7</sup> and protein digestibility is enhanced by 4 to 40 % as compared to raw material<sup>8</sup>.

The experimental diets were fed for 10 days<sup>9</sup> including the three days of pre-experimental period. The records of daily feed consumption within replicate basis were maintained during experimental period. The excreta were collected at 24 h interval and were dried in hot oven at 100 °C. The nitrogen content of the experimental diets and excreta were determined by Semimicro Kjeldahl method<sup>10</sup>.

### RESULTS AND DISCUSSION

The nutritional quality of protein depends upon the total amount of amino acids present in the protein, the relative proportion of the constituent amino acid and the degree to which the animal can liberate and utilize the amino acids from the protein *i.e.* amino acid availability<sup>11</sup>. The present investigation nutritive value for six new variety legume seeds (Arkel, Pusa pragati, IPF-99-25, JP-885, MM-15 and JM-6) of *Pisum sativum* in terms of feed utilization, nitrogen utilization and protein efficiency ratio were performed. The experiment was performed on the white male albino rats. The experimental results are mentioned in Tables 1-3. The similar results are also observed in different other legumes varieties<sup>12-16</sup>.

TABLE-1  
COMPOSITION OF EXPERIMENTAL DIET (g/kg) AND PROTEIN VALUES (%)

Diet ingredients	Balance diet	Diet					
		Arkel	Pusa pragati	IPF-99-25	JP-885	MM-15	JM-6
Maize yellow	450	330	320	310	310	310	310
Fat	20	80	80	80	80	80	80
Groundnut cake	430	390	390	400	410	400	410
Legume	-	100	110	110	100	110	100
Fish meal	80	80	80	80	80	80	80
Mineral mixture	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Vitamin mixture	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Calculated value of protein (%)	25.16	24.59	24.70	24.86	24.875	24.88	24.99
Analyzed value of protein (%)	25.23	25.61	24.92	25.11	24.98	25.01	25.21
Analyzed value of nitrogen (%)	4.0368	4.0916	3.9872	4.0176	3.9968	4.0016	4.0336

TABLE 2  
FEED INTAKE, FEED UTILIZATION, % FEED UTILIZATION, NITROGEN INTAKE, NITROGEN UTILIZATION, % NITROGEN UTILIZATION/RAT/DAY

Diet	Feed				Nitrogen			
	Intake (g)	Voided (g)	Utilization (g)	Utilization (%)	Intake (g)	Voided (g)	Utilization (g)	Utilization (%)
Balanced diet	17.00	1.42	15.58	91.6	0.686	0.060	0.626	91.25
Arkel	21.23	2.29	18.94	89.2	0.870	0.019	0.771	88.62
Pusa pragati	16.97	1.62	15.35	90.5	0.676	0.068	0.608	89.94
IPF-99-25	21.33	2.21	19.12	89.6	0.857	0.091	0.766	89.38
JP-88-25	20.66	2.82	17.84	86.4	0.826	0.118	0.709	85.72
MM-15	17.30	1.72	15.58	90.1	0.692	0.071	0.621	89.73
JM-6	18.76	1.99	16.77	89.4	0.756	0.087	0.669	88.50

TABLE 3  
GAIN IN BODY WEIGHT, TOTAL PROTEIN CONSUMED, PROTEIN EFFICIENCY RATIO (PER) FEED EFFICIENCY RATIO (FER) /RAT/10 DAYS

Diet	Protein in diet (%)	Gain in body wt (g)	Total feed consumed (g)	Total protein consumed (%)	Protein efficiency ratio (PER)	Feed efficiency ratio (FER)
Balanced diet	25.16	45.40	170.0	42.77	(+) 1.0610	(+) 0.267
Arkel	24.59	56.66	212.3	52.20	(+) 1.0850	(+) 0.267
Pusa pragati	24.70	48.32	169.7	41.91	(+) 1.1530	(+) 0.285
IPF-99-25	24.86	55.26	213.3	53.02	(+) 1.0420	(+) 0.259
JP-88-25	24.87	52.10	206.6	51.38	(+) 1.0140	(+) 0.252
MM-15	24.88	44.68	173.0	43.04	(+) 1.0380	(+) 0.258
JM-6	24.99	47.12	187.6	46.88	(+) 1.0051	(+) 0.251

The protein efficiency ratio (PER) was calculated after dividing gained in body weight (g) by per gram of protein ingested with respect to 10 days<sup>17</sup> and mentioned in Table-3. Feed efficiency ratio (FER) was obtained after dividing weight gained value by the diet intake value with respect to 10 days<sup>16</sup>. These value of feed efficiency ratio (FER) were observed to be higher than the value of control diet in Pusa pragati with (+0.285), indicating high nutritive value, it is also in general agreement with the values of legume reported earlier<sup>7,12-14,16,18</sup>. The high nutritive value of these are primarily attributed to abundance of protein, essential amino acids, essential fatty acids, the presence of vitamins and trace elements minerals, which is beneficial to human health.

Percentage utilization of feed in the blank was found high with 91.6 % while the samples reported lesser with 90.5 to 86.4 % and the percentage of nitrogen utilization in blank was found 91.25, while remaining all samples were found to be in lesser with 89.73 to 88.5 %. This decrease in the utilization might be due to anti nutritive factors which may not properly destroyed by autoclaving. Special methods of detoxification can improve the protein availability. In such cases detoxification can be done by different heat treatment but it effects the quality of proteins and disturbs the amino acid make up<sup>19,20</sup>.

#### ACKNOWLEDGEMENT

The authors express sincere thanks to Dr. Vishal Mudgal, Assistant Professor, Department of Animal nutrition, Veterinary and Animal Husbandry College Jabalpur, for formulation of diet.

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(Received: 12 August 2009; Accepted: 22 January 2010) AJC-8346