

## PREPARATION AND NUTRITIONAL EVALUATION OF PALATABLE "DAL" AND "BARRIAN" FROM SOYBEAN

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Dehulled split pulses are made from major pulses in Pakistan and called *dal*. Attempts have been made to prepare a trypsin inhibitor-free *dal* from soybean. Nutritive values were highly improved and the cooking time of the processed *soy dal* was cut down to the minimum. *Soy dal* is similar in texture, flavour and appearance to indigenous chick pea *dal*. *Barrian* were prepared from the processed soybean.

### INTRODUCTION

Low income groups of Pakistan mostly use pulses in diet, because the animal protein is relatively more expensive. Dehulled split pulses are made from the major pulses of Pakistan called *dals*. Gruel-type foods are made from broken pulses as also *barrian* — a mixture of spices and ground moist *dal*. The proteins of pulses individually are deficient in certain aminoacids and thus not a good substitute for animal protein. Consequently, one of the best suggestions for meeting the shortage of animal protein is to make use of soybean in the form of *dal* and *barrian* for improving the diet of those who are in need of more and better quality protein. Soybean *dal* is also cheaper than other pulses. The quality of the protein in soybean is good and the protein content high. Its protein has a good balance of aminoacids and with the addition of sulphur amino acids from cereals such as wheat and rice, nutritional values of the mixtures are highly increased but the direct human consumption of soybean is low because of its poor acceptability for many dishes, firstly due to its strong disagreeable flavour and, secondly, because it is not very appetizing. Raw soybean also contains trypsin inhibitor which if not removed, reduces the nutritive value. Another problem discouraging the use of soybean is the long cooking time required to develop an acceptable texture. James *et al.* [1] have described that *soy dal* can be prepared with reduced cooking time. In the present investigation, attempts have been made to produce a blend palatable *dal*. Therefore, work was taken up to prepare such *dals* and *barrians* with reduced cooking time, and free from trypsin inhibitor. The "William" variety which is cultivated in a limited area of Pakistan with an annual production of 1,234 tonnes [2] was used during the present investigation.

### EXPERIMENTAL

The chemical composition of the whole beans was determined [3] on the dried basis protein (N x 6.25).39.0%, fat 23.2%, ash 60%, fibre 5.6% and carbohydrates 26.2%. Soybeans were cleaned and dehulled in a stone mill without breaking or crushing the cotyledon. Cotyledons were separated from hulls by blowing air. The cotyledons thus obtained were boiled with sodium bicarbonate solutions of various concentrations for 30 min. Then the solutions were drained off and soybeans were washed with boiling water to remove the alkali. The cooked dehulled soybeans were dried at 75 – 80° to 6% moisture in the cabinet dryer. The samples of soybean *dal* thus prepared and raw soybean *dal* were cooked just like other pulses to the desired texture and presented before a panel of 8 judges for organoleptic evaluation with regard to appearance, texture, taste and flavour. The time needed for cooking and the remarks of the Taste Panel members are shown in Table 1.

*Preparation of soybean "Barrian".* Soybean *barrian* were prepared from treated soybean *dal* in the traditional manner. 100 g of the soybean *dal* were soaked in hot water at 75 – 80° for 2 hr. The soft soybean *dal* was then blended with the addition of some water after adding 2 g baking powder, 4 g common salt, 3 g black pepper, 3 g coriander, 2 g pomegranate seed and 1-2 g chilli powder. The *barrian* were dried at 74 – 80° to 6% moisture in a cabinet dryer. The *barrian* thus prepared were cooked like meat curry in the traditional manner. Organoleptic evaluation revealed that soybean *barrian* were acceptable in flavour, texture and taste.

*Determination of Trypsin Inhibitor.* Trypsin inhibitor units of soybean *dal* and *barrian* were determined according to the method of Brocher *et al.* [4] The results are shown

in Table 2. Soybean *dal* and soybean *barrians* prepared as mentioned above were free from trypsin inhibitor.

*Determination of Net Protein Utilization of Raw Soybean and Soybean dal.* Soybean and soybean *dal* were ground to pass a 60 mesh sieve. Soybean flour and flour of soybean *dal* were mixed in a semi-synthetic diets by replacement of maize starch in such a manner that the protein contents of diets were 10%.

The Net Protein Utilization of the diets thus were determined according to the method of Miller *et al.* [5] using male albino rats weighing 30 – 35 g. The composition of the experimental diets and the results of NPU determination and shown in Table 3.

The diet contained the following other ingredients; hydrogenated fat, 15 g; glucose, 15 g; potato starch, 10 g; vitamins mixture, [6] 5 g; minerals mixture, [6] 5 g;

*Determination of Protein Efficiency Ration (PER) and Digestibility.* Sixteen albino rats weighing 35 – 40 g were divided into 2 groups in such a manner that average weight of rats of both groups was indential. One group was fed on soybean diet and the other one on diet of treated soybean *dal*. Feeding was continued for a period of 4 weeks and the record of weight gain and food intake and faeces was maintained. PER was calculated by dividing the weight gain by rats with the protein intake and digestibility by using the formula:

$$\frac{\text{wt. of intake diet} - \text{wt. of faeces}}{\text{wt. of intake diet}} \times 100$$

as shown in Table 4.

## DISCUSSION

In the present investigation attempts have been made for the preparation of soybean *dal* and *barrians*. The main obstacle in the acceptability of soybean as soybean *dal* had been removed sufficiently. Housewives have to spend many painful hours and waste considerable fuel for its complete cooking. This difficulty was overcome as it was observed from Table 1 that the time needed for cooking the untreated *dal* is 100 – 120 min. In addition, the flavour of the cooked *dal* is disagreeable. The cooking time of processed *dal* was cut down to 40 – 45 min. when the cotyledones were boiled directly with 0.3% sodium bicarbonate solution for 30 min. It was also noted that taste and colour of the cooked *dal* deteriorate when cotyledons are treated with a solution of sodium bicarbonate stronger than 0.3%. Hence these studies revealed that the boiling of soybean immediately just after dehulling with 0.3% sodium bicarbonate solution for 30 min. was the most suitable method to prepare the processed *dal*. As shown in Table 2, treated soybean *dal* and *barrian* were also free from trypsin inhibitor. It is clear from Table 3 that the NPU of soybean *dal* was 63.5 as compared to 51 for soybean protein. It was observed from Table 4 that the PER of soybean *dal* is 2.3 as compared to 1.34 from whole soybean protein. The above results indicate that raw soybean contains an anti-nutritional factor which was removed during the process of soybean *dal* preparation and as a result the nutritive values were highly improved and were slightly less than that of milk protein. [7] Besides, it is also

Table 1. Organoleptic evaluation of treated and untreated dal

Sample/ treatment	Time in min. needed for cooking to attain the desired texture	Remarks of Taste Panel Members		
		Colour	Flavour	Taste
Untreated <i>soy dal</i>	100 – 120	Good	Disagreeable beany flavour	Unacceptable
0.2% NaHCO <sub>3</sub>	70 – 75	Acceptable	Acceptable	Good
0.3% NaHCO <sub>3</sub>	40 – 45	Good	Good	Good
0.4% NaHCO <sub>3</sub>	40 – 45	Unacceptable (dark colour)	Acceptable	Slightly bitter
0.5% NaHCO <sub>3</sub>	40 – 45	Unacceptable (very dark in colour)	Acceptable	Bitter taste

Table 2. Trypsin inhibitor units of raw soybean and its dal

Sr. No.	Material	Inhibition %	Trypsin inhibitor units x 10 <sup>-3</sup>
1.	Raw soybean	54.5	2.4
2.	Soybean <i>dal</i>	nil	nil
3.	Soybean <i>barrian</i>	nil	nil

Table 3. Percentage composition and Net Protein Utilization (NPU) of the experimental diets containing soybean and soybean *dal*

Diets	Soy-bean	Soy-bean "dal"	Maize starch	Net Protein Utilization at 10% protein level
Soybean (N% x 6.25)	260	—	24.0	51.0
Soybean "dal" (N% x 6.25)	—	25.0	25.0	63.5

Table 4. Protein Efficiency Ratio of the Experimental Diet (Experimental period, 4 weeks, 8-rat groups)

Source of Protein	Digestibility %	Protein Efficiency Ratio (PER)
Soybean	85.0	1.34
Soybean <i>dal</i>	94.7	2.30

observed from Table 4 that the digestibility of the processed soybean *dal* is also higher than that of the raw soybean which also indicates that removal of trypsin inhibitor has improved digestibility. *Barriars* prepared from the processed soybean *dal* were also free from disagreeable flavour and were similar in texture, appearance and taste to that of other pulses but are cheaper than other pulses.

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