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Monograph

# Chemical Composition, Classification and Traditional Method of Production of Khoa

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## 1. Introduction

Khoa is one of the most important bases for preparing indigenous sweets. The production of khoa was 4.9% in the year 1966 while only 8.7% of milk was being used for the production of products out of the total dairy production. However, the total khoa production is over 300 million kg valued at 300 crores at the present rate. Khoa is mostly produced in northern and western part of our country. The maximum amount of khoa is produced by Uttar-Pradesh, nearly 36.0% of the total production. Even in U.P. the major khoa producing cities and their surrounding area are Meerut, Muradabad, Muzaffarnagar, Aligarh, Hathars, Etawah, Kanpur etc.

### 1.1 Definition

Khoa/Khava/Mawa refers to the partially desiccated whole milk product prepared by continuous heating of milk in a karahi over a direct fire, while also constantly stirring cum scrapping by using a khunti till it reaches to semi-solid (doughy) consistency. Thereafter, the pan contents are removed from the fire and worked up into solid mass known as khoa-pat.

According to P.F.A act (1954) as applicable October 1<sup>st</sup> 2004, khoa sold by whatever variety or name such as Pindi, Dhap, Danedar. Mawa or Kava means the product obtained from cow or buffalo or goat or sheep milk or milk solids or a combination thereof by rapid drying. Its milk fat content shall not be less than 30% on dry matter basis of the finish products. It may contain citric acids not more than 0.1% by weight. It shall be free from added starch, added sugar and

added coloring matter. As per the P.F.A. amendments of 7<sup>th</sup> December 2006, khoa shall contain no more than 50,000/gm total plate count, not more than 90/gm coliform count and not more than 250/gm yeast and mold count. E.Coli, Aerobic spore count and *Listeria monocytogenes* shall be absent in 1(one) gm of khoa whereas *Salmonella* and *Shigella* shall be absent in 25 gm.

### 1.2 Food Safety and Standards (Food Products Standards and Food Additives) Regulation 2011

These regulations come into force on or after 5<sup>th</sup> August 2011. Food Business operators shall comply with the provisions of these regulation within six month from the date of commencement of regulation. Khoa- Khoa by whatever variety of names it is sold such as Pindi, Danedar, Dhap. Mawa or Kava means the product obtained from cow or buffalo or goat or sheep milk or milk solids or a combination thereof by rapid drying. The milk fat content shall not be less than 30 percent on dry weight basis of the finish products. It may contain citric acid not more than 0.1% by weight. It shall be free from added starch, added sugar and added colouring matter. The microbiological standards are as listed below:

Total plate count- 50,000/gm

Coli form count - 50/gm

*Staphylococcus aureus*-50/gm

Yeast & mould count -50/gm

Sample size-100gms

Storage and transport temperature- 0°-4°C

### 1.3 Bureau of Indian Standards (BIS) specifications

According to BIS (IS 4883,1980) Khoa is a heat coagulated milk product obtained by partial dehydration of milk of buffalo, cow, sheep and goat or their admixture. It shall not contain any ingredient foreign to milk except the addition of citric acid in Danedar khoa added to develop the desirable characteristic. The requirement of the three types of khoa viz. Pindi, Danedar and Dhap designated by BIS are given in table 1.1:

**Table 1.1: I.S. 4883 (1980) Requirements for different types of khoa**

Sl. No.	Characteristics	Pindi	Danedar	Dhap
i.	T.S.% by mass (min.)	65	60	55
Ii	Fat % by mass (on dry basis) mini.	37	37	37
Iii	Total ash % by mass (on dry basis) max.	6.0	6.0	6.0
iv.	Titration acidity (as lactic acid) %	0.8	0.9	0.6



	by mass (max.)			
V	Coliform Count per gm (max.)	90	90	90
Vi	Yeast and mould Count per gm (max.)	50	50	50

## 2. Size of the khoa Industry

The annual production of Khoa is estimated at more than one million tones utilizing about 600 million tons of milk, equivalent to 7% of total milk production. Khoa production is mainly confined to the non-organized sector. However, now some 20 plants have undertaken mechanized production of high quality khoa on industrial scale, including a few on continuous production basis (Aneja R.P. *et al.*, 2002).

## 3. Classification

Batch wise method of khoa production and lack of standardization causes wide variations in the physico-chemical and microbiological quality of the market product. For commercial trade three main type of Khoa are recognized – Pindi, Dhap, and Danedar, each type having preferred uses. Delhi being the biggest marketing centre of khoa have different price for all the three varieties.

**Table 1.2: Types of khoa, their composition and their preferred end uses**

Type	Gross composition percentage			Specific sweets prepared	Remarks
	Fat	Total solids	Moisture		
Dhap	20-23	56-63	37-44	Gulab Jamun, Pantooa etc.	
Pindi	21-26	67-69	31-33	Burfi (plain, chocolate, coconut) Peda etc.	
Danedar	20-25	60-65	35-40	Kalakand, ground burfi etc.	Milk of high acidity produces granular khoa.

(Sukumar De, 2019)

**Table 1.3: BIS standard for three khoa varieties**

Type of Khoa	Total solids (Minimum)	Fat on Dry matter (Minimum)	Ash on Dry matter (Maximum)	Titration acidity as % lactic acid maximum	Coliform count/gm max.	Yeast & mould count / gm max.
Dhap	55	37	6	0.6	90	50
Pindi	65	37	6	0.8	90	50
Danedar	60	37	6	0.9	90	50



Pindi type khoa is prepared by heating for a longer period in the pan to achieve lower moisture content than Dhap and Danedar. If citric acid (about 0.1% of khoa) is added towards the last stages of desiccation, Danedar Khoa is obtained. The end product is then removed from the pan, uniformly spread over trays and allowed to cool under atmospheric condition.

**3.1 Pindi** – It is characterized as a circular ball of a hemispherical pat with smooth body and texture. The grain in it is very fine and of uniform size. The product shall be free from burnt particles as well as from any browning defects. They should possess characteristic cooked flavour and also should be free from objectionable odour and sour (acidic) taste.

**3.2 Dhap** – It is characterized by loose and sticky body and smooth texture. It contains less than 60% by mass of total solids and higher moisture content than pindi and danedar types. Dhap is preferred for preparation of gulabjamun as it forms uniform balls with desired rheological qualities after frying and soaking in sugar syrup.

**3.3 Danedar** – It is characterized by its granular texture and uneven body. The size of grains depends upon the amount of coagulant added and the quantity of milk used. Citric acid when added should not exceed 0.1% of the product. This type of khoa is used as a base for the preparation of kalakand, cakes and pastries where granulations are valued to greater extent.

The chemical composition of Khoa of different breeds of the animals however depend upon composition of milk solids, degree of concentration of milk and losses and gain in handling. The average composition of laboratory made khoa from the cow milk (Fat – 4.8% T.S. -13.8 and ratio of concentration 5.4 times) and buffalo milk (Fat – 8.4%, T.S. 18.2% and ratio of concentration 4.5 times) is given below table 1.4.

**Table 1.4: Chemical composition of khoa (%age)**

Type of Milk	Composition						Composition of milk
	Moisture	Fat	Protein	Lactose	Ash	Iron ppm	
Cow	25.6	25.7	19.2	25.5	3.8	103	F – 4.8, T.S.-13.8, R.O.C. – 5.4
Buffalo	19.2	37.1	17.8	22.1	3.6	101	F – 8.4, T.S.-18.2, R.O.C. – 4.5

F=Fat, T.S.= Total solid, ROC=Ratio of concentration

High iron content in khoa may be ascribed to its removal from the surface of the iron karahi and incorporation of some of this iron into the finish product during vigorous stirring cum scrapping (normally milk contains 2-4 ppm of iron) (Sukumar De, 2019).



Different types of khoa are prepared from cow and buffalo milk. The physical quality of khoa like colour, appearance, body and texture, smell taste are differed from preparation of cow and buffalo milk. The physical quality of cow and buffalo milk khoa are given below table 1.5.

**Table 1.5: Physical quality of cow and buffalo milk khoa**

Sl. No.	Particulars	Cow	Buffalo
1.	Colour	Straw/pale yellow with a tinge of brown	Whitish (dull light greenish white) with a tinge of brown
2.	Appearance	“Moist” Surface	Slightly oily/greasy surface
3.	Body	Slightly hard	Soft
4.	Texture	Slightly sandy	Smooth, granular
5.	Smell	Rich, nutty	Rich, nutty
6.	Taste	Slightly salty	Slightly sweet
7.	Suitability for sweets	Suitable	Highly suitable

**4. Traditional Method of production of khoa** – The traditional method of preparing Khoa utilizes simple utensils like a open bowl shaped metal frying pan called karahi and a long handle flat edged metal scrapper called “Khunti” for desiccation. The fat level is usually 4.0% for cow milk and 5.0% for buffalo milk. About 4-6 litres milk is taken in a shallow, iron/mild steel pan and heated over a brisk non smoky fire. The milk is stirred vigorously and constantly with a circular motion by a khunti. During the operation all parts of the pan with which the milk comes into contact are lightly scrapped to prevent milk from scorching. Constant evaporation of moisture takes place and milk thicken progressively. At a certain concentration (cow milk 2.8 time of T.S., buffalo milk 2.5 times of T.S. concentration) heat coagulation of milk proteins begins and concentrate becomes progressively insoluble in serum phase. This stage is marked by abrupt change in colour. The colour of the milk becomes pale-yellow. Heating is continued with greater control hereafter and the speed of stirring cum scrapping increased. Soon the viscous mass reaches a semi-solid/ pasty consistency and begins to dry up. Very close attention is paid to last stages. The final product is ready when it shows the sign of leaving the bottom and sides of the karahi and sticking together. The khoa-pat is made after removing the pan from the fire and working the content with a wooden ladle to give a single compact mass.

**Figure 1.1: Flow diagram of khoa manufacture by traditional method**

Milk (4 to 6 litres)



Heated over brisk non smoky fire



Stirring cum scrapping continuously and vigorously of milk with a Khunti in circular motion.



After 10-12 minutes protein starts separating from serum phase at 2.8 times of T.S. for cow milk and 2.5 times for buffalo milk. At this stage protein loses its colloidal character and colour of milk becomes pale yellow.



Heating is continued with vigorous stirring cum scrapping on low heat fire.



Viscous mass changes to semi solid consistency and begins to dry up (3.5 to 5.0 times T.S.)



Heated till the product starts leaving the sides and bottom of the karahi (5.4 to 6.0 times T.S.)



Khoa pat is made by removing the karahi from fire and working it with a wooden ladle. Finally, it is packed in different shape and size.

Khoa contains high proportion of fat, protein and lactose. It is important for preparation of different types of sweets like gulabjamun, pantua, burfi, kalakand etc.

## 5. Conclusion

Khoa is a heat coagulated dairy product obtained by partial dehydration of milk of buffalo, cow, sheep and goat or their admixture. Khoa shall not contain any foreign ingredient to milk except the addition of citric acid in Danedar khoa added to develop the desirable characteristic flavour. There are three types of khoa like Pindi, Danedar and Dhap. All types of khoa are important for preparation of different types of sweets.

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