

CAMEL MILK CHEESE:

Challenges, Processing, and Quality

Assessment



مزارع العين



Al Ain Farms

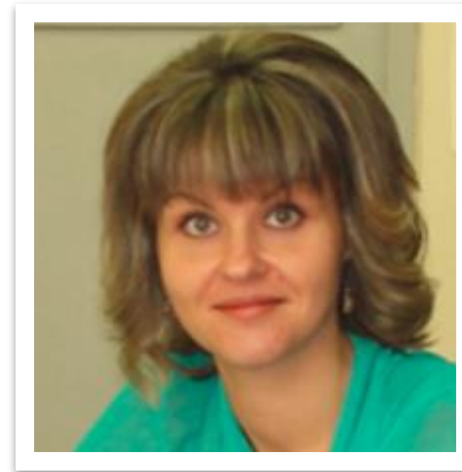
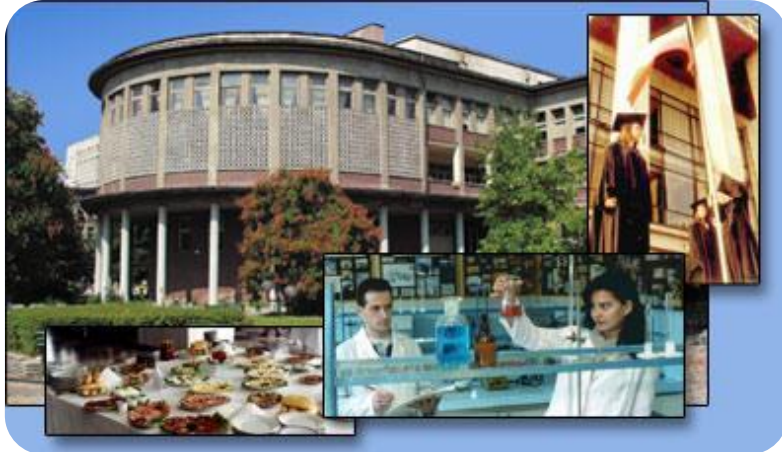


UNIVERSITY OF FOOD TECHNOLOGIES – PLOVDIV BULGARIA



Faculty of Technology

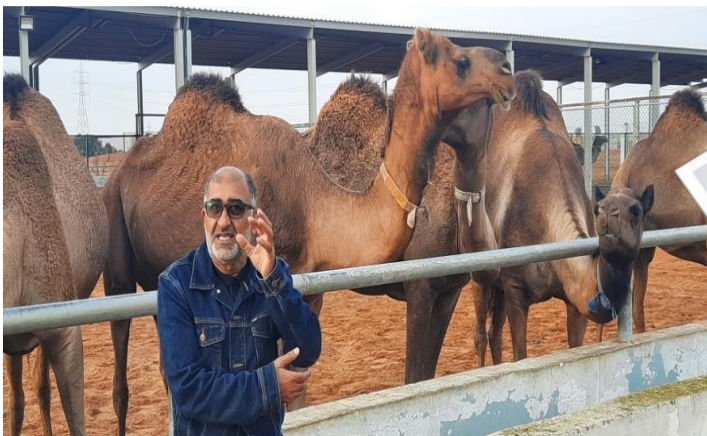
Department of Dairy and Milk
Products Technology



**Assoc. Prof. Tatyana
Balabanova, PhD**

tbalabanova@uft-plovdiv.bg





MU gift





Table 1. Physicochemical and Sensory Characteristics of Milk Samples

Properties	Milk samples		
	Camel	Cow	Mix (1:1)
Physicochemical			
Dry matter, %	12.7±0.12 ^a	12.2±0.10 ^b	12.5±0.12 ^c
Water content, %	87.3±0.11 ^a	87.8±0.09 ^a	87.5±0.13 ^a
Solids Not Fat, %	9.4±0.01 ^a	8.7±0.05 ^b	9.1±0.01 ^c
Fats, %	3.3±0.01 ^a	3.5±0.05 ^a	3.4±0.05 ^a
Proteins, %	3.3±0.01 ^a	3.3±0.02 ^a	3.3±0.01 ^a
Carbohydrates, %	5.1±0.04 ^a	4.7±0.04 ^a	4.9±0.03 ^c
Solids, %	1.0±0.02 ^a	0.7±0.01 ^b	0.9±0.03 ^a
Density, g/cm³	1.029±0.01 ^a	1.028±0.01 ^a	1.029±0.00 ^a
Freezing pont, °C	- 0.542±0,002 ^a	- 0,554±0,001 ^b	- 0.550±0,001 ^c
Titration acidity, °T	17.0±1.0 ^a	15.0±1.0 ^a	16.0±1.0 ^a
pH	6.45±0.03 ^a	6.71±0.06 ^b	6.66±0.05 ^b
Antibiotics	Negative	Negative	Negative
Sensory			
Appearance	A uniform liquid with foam on the surface	Uniform liquid	Uniform liquid
Flavor	The flavor is distinct and has a slightly salty taste	Distinctive with a mildly sweet flavor	The flavor profile is specific, featuring both sweet and salty tastes
Odor	Specific and pleasant	Specific and pleasant	Specific and pleasant
Color	White	White with a slight creamy tint	White with a slight creamy tint
Consistency	Uniform liquid	Uniform liquid	Uniform liquid



CAMEL MILK

Low in Lactose and Casein

Low in Saturated Fats

Low in Cholesterol

Easy to digest

3X more Vitamin C

10x more Iron

Higher in Calcium

Higher in Vitamins A & B



COW MILK

High in Casein and

Lactose

High in Saturated Fats

High in Cholesterol

Difficult to digest

Contains many

Allergens

Table 2. Amino Acid Composition of Milk Samples

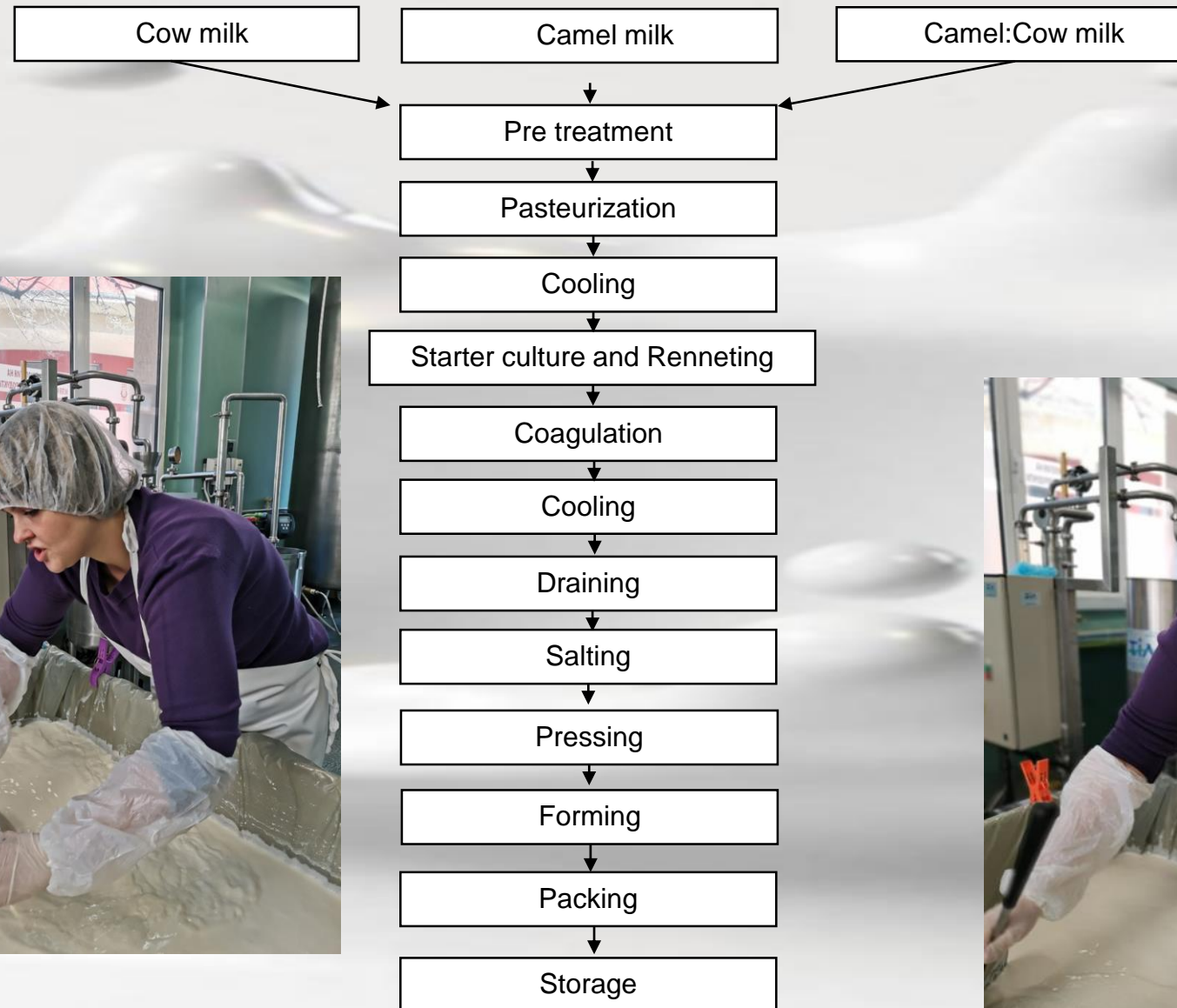
Amino acids	Milk samples, % of total protein (TP)		
	Camel	Cow	Mix (1:1)
Alanine	2.19±0.04 ^a	1.53±0.07 ^b	1.89±0.05 ^c
Valine	6.32±0.05 ^a	4.68±0.05 ^b	5.56±0.06 ^c
Leucine	8.51±0.10 ^a	9.86±0.13 ^b	7.49±0.11 ^c
Isoleucine	4.94±0.08 ^a	5.64±0.07 ^b	4.35±0.08 ^c
Glycine	1.45±0.02 ^a	2.36±0.03 ^b	1.27±0.03 ^c
Proline	10.71±0.10 ^a	6.74±0.09 ^b	9.42±0.12 ^c
Serine	4.74±0.07 ^a	5.47±0.07 ^b	4.17±0.07 ^c
Threonine	4.55±0.06 ^a	3.37±0.05 ^b	4.00±0.05 ^c
Methionine	2.81±0.05 ^a	1.36±0.03 ^b	2.47±0.01 ^c
Aspartic acid	6.30±0.07 ^a	8.22±0.05 ^b	5.55±0.08 ^c
Glutamic acid	17.52±0.15 ^a	15.14±0.17 ^b	16.74±0.14 ^c
Phenilalanine	4.23±0.08 ^a	5.38±0.05 ^b	3.72±0.07 ^c
Tyrosine	6.11±0.03 ^a	6.69±0.01 ^b	5.38±0.01 ^c
Arginine	4.80±0.07 ^a	5.50±0.06 ^b	6.22±0.06 ^c
Histidine	2.84±0.04 ^a	3.53±0.02 ^b	2.50±0.06 ^c
Lysine	8.42±0.08 ^a	10.04±0.07 ^b	9.41±0.07 ^c
Cystine	1.36±0.02 ^a	1.71±0.02 ^b	1.20±0.03 ^c
Tryptophan	2.20±0.02 ^a	2.78±0.03 ^b	2.94±0.03 ^c



Table 3. Fatty Acid Composition of Milk Samples

Fatty acids C:D	Classification	Milk sample, % of total fat		
		Camel	Cow	Mix (1:1)
	Saturated fatty acids			
C _{4:1}	Butyric	0.90±0.04 ^a	9.35±0.02 ^b	6.79±0.04 ^c
C _{6:0}	Caproic	0.28±0.03 ^a	4.01±0.03 ^b	3.25±0.02 ^c
C _{8:0}	Caprylic	0.22±0.01 ^a	0.78±0.03 ^b	0.32±0.03 ^c
C _{10:0}	Capric	0.31±0.07 ^a	2.24±0.05 ^b	1.27±0.06 ^c
C _{12:0}	Lauric	0.49±0.09 ^a	3.60±0.07 ^b	2.43±0.07 ^c
C _{14:0}	Myristic	10.24±0.51 ^a	12.20±0.53 ^b	9.01±0.53 ^c
C _{16:0}	Palmitic	29.16±1.13 ^a	23.25±1.14 ^b	27.78±1.13 ^a
C _{18:0}	Stearic	12.13±0.46 ^a	10.12±0.46 ^b	9.62±0.48 ^c
	Monounsaturated fatty acids			
C _{14:1}	Myristoleic	1.68±0.50 ^a	0.12±0.42 ^b	1.20±0.48 ^c
C _{16:1}	Palmitoleic	3.09±1.30 ^a	0.93±0.28 ^b	2.52±0.30 ^c
C _{18:1n9c}	Oleic	34.23±0.80 ^a	30.04±0.79 ^b	28.20±0.87 ^c
	Polyunsaturated fatty acids			
C _{18:3n3c}	α-Linoleic	4.58±0.56 ^a	2.08±0.61 ^b	5.03±0.60 ^a
C _{18:3n6c}	γ-Linoleic	0.50±0.01 ^a	0.80±0.02 ^b	0.64±0.01 ^c
	Polyunsaturated fatty acids			
C _{18:3n3c}	Linolenic	2.19±0.02 ^a	0.48±0.03 ^b	1.93±0.03 ^c

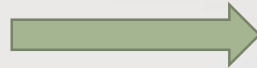
General Procedure for Producing Fresh Cheese



Storage of Cheese Samples



Chemical Composition



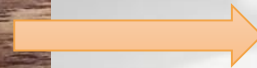
Indicators of Ripening



Microbiological Analyses



Determination of Fatty Acids



Determination of Amino Acids



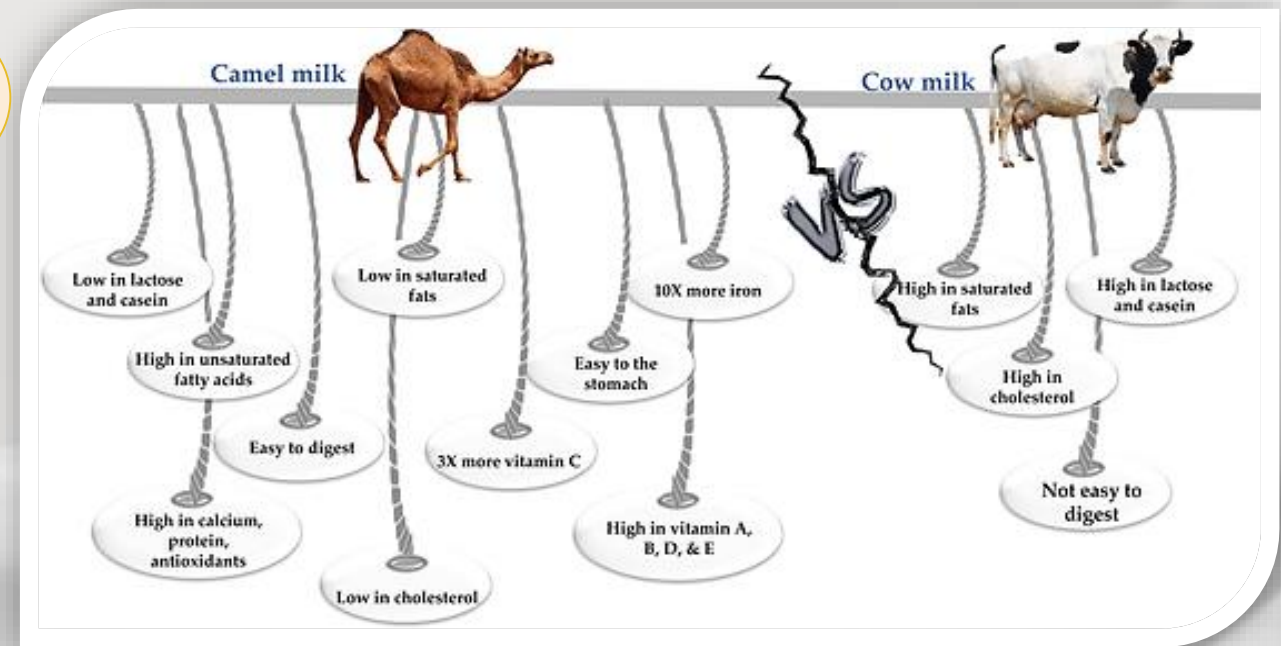
Texture Profile Analysis



Sensory Assessment

Conclusion

- *Camel milk is a highly nutritious dairy product that offers several health benefits and can be consumed daily as a beverage;*
- *It is rich in vitamins and minerals, and its small fat globules and low saturated fatty acid (SFA) content make it easy to digest;*
- *Additionally, the low incidence of allergic reactions among consumers can be attributed to its very low levels of β -lactoglobulin and a high concentration of β -casein in its protein composition;*



Conclusion

- Camel milk has a low tendency to coagulate, mainly due to the absence of interactions between κ -casein and β -lactoglobulin. This feature presents several challenges in producing dairy products.
- Research indicates that using starter cultures and camel chymosin for cheese production from camel milk—whether used alone or in combination with other types of milk—is an effective method for making cheese.
- Further research is needed to enhance cheese processing techniques and to investigate the utilization of whey in nutritious diets.

Key points to consider include the following:

1. Adding starter cultures to cheese milk promotes acidification, which influences various aspects of the cheese-making process. This ultimately affects the cheese's composition through lactic acid production and a decrease in curd pH;
2. The recommended concentration of chymosin can be applied at low to medium levels.

Based on the results, we recommend using camel milk to produce commercial cheese!

FUTURE PROJECTS





***THANK YOU
FOR YOUR ATTENTION !***