

# Improvement of dairy products properties and of utilization of by- products

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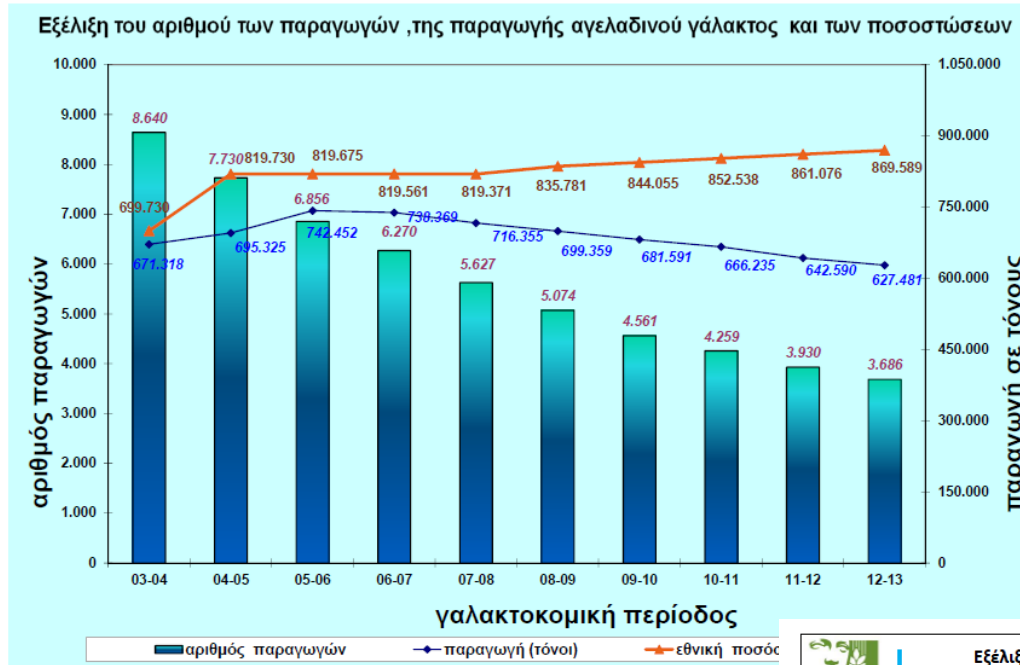
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# **Characteristics of the Greek dairy sector**

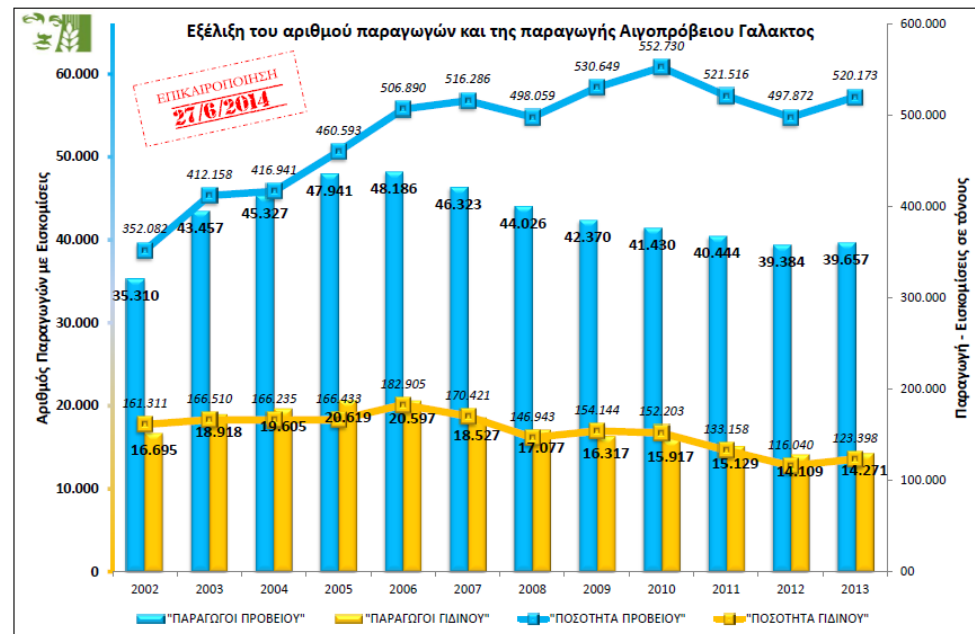
# Milk production (tn) (1/2)

## Cow milk



Πηγή : ΕΛΛΗΝΙΚΟΣ ΓΕΩΡΓΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ "ΔΗΜΗΤΡΑ"

## Sheep & Goat milk



## Milk production (tn) (2/2)

	Cows' milk	Sheep milk	Goat milk
2014	~ 615.000	~540.000	~130.000

Source: [www.elog.gr](http://www.elog.gr)

### Greece is:

- **1<sup>st</sup>** in goat breeding and **4<sup>th</sup>** in sheep breeding in EC
- **2<sup>nd</sup>** in goat milk production in EC

The most part of goat milk is produced by animals of Greek indigenous breeds, which produce moderate quantities of milk with “strong” casein variants, high fat, protein and total solids content → improved technological properties

# Cheese production

- Cheeses account for the 40% of retails of dairy products
- **Exports** of cheeses from cows' milk increased by **11.8%** during 2001-2011
- **Imports** of cheeses from cows' milk increased by **72%** during 2001-2011
- **Exports** of cheeses from sheep milk increased **7.7%** during 2001-2011 with almost zero imports

## Total cheese production in Greece (ICAP – 2014)

Year	Industrial production	Farmhouse production	Total	Change (%)
2008	186.189	79.000	265.189	3,79
2009	195.294	73.800	269.094	1,47
<b>2010</b>	207.883	78.200	<b>286.083</b>	<b>6,31</b>
2011	188.874	83.300	272.174	-4,86
2012	195.046	84.000	279.046	2,52
<b>2013</b>	190.000	85.000	<b>275.000</b>	<b>-1,45</b>

# Production of Greek PDO cheeses (tn)

ΠΟΠ Τυριά	2008	2009	2010	2011	2012	2013
Feta	91.734	95.367	101.17	92.484	86.567	94.765
Kaseri	2.516	2.633	3.964	3.134	2.773	2.527
Kefalogriaviera	2.205	2.165	2.408	2.539	2.511	2.304
Gruyere of Kritis	1.261	786	1.247	1.294	1.732	1.759
Gruyere of Naxou	645	819	1.003	874	968	1.031
Manouri	1.010	1.079	1.006	896	840	925
Kalathaki Limnou	472	436	203	359	506	401
Ladotyri Mytilinis	193	237	188	317	497	413
Katiki Domokou	271	449	388	317	389	455
Galotyri	370	285	263	232	175	220
Sfela	83	54	70	92	86	75
Xinomyzithra Kritis	10	4	31	45	36	43
Bantzou	55	68	34	47	26	26
Formaella Arachovas	2	0	1	6	22	26
Pichtogalo Chanion	8	6	20	22	21	18
Anevato	17	9	12	18	11	14
Kopanisti	31	35	31	39	2	5
San Michali	48	50	101	46	0	21
Gruyvere Agrafon	0	0	0	0	4	0
Xigalo Sitias	0	0	0	0	0	0
Metsovone	0	0	0	0	0	0
<b>Total</b>	<b>100.931</b>	<b>104.482</b>	<b>112.115</b>	<b>102.841</b>	<b>97.164</b>	<b>105.083</b>

# Yoghurt production

## Total yoghurt production in Greece (ICAP – 2014)

Year	Production (tn)	Imports	Exports
2008	102.289	13.411	23.468
2010	95.307	14.996	23.087
2012	95.648	15.425	27.849
<b>2014</b>	102.000	<b>16.600</b>	<b>40.000</b>

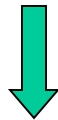


**Research on Dairy Products performed in the  
Dairy Laboratory of AUA by our group**



# MILK

- Detailed study of the composition and technological properties of ruminant's milk
- Characterization of protein fractions of goat milk from various Greek indigenous breeds
- Detection of adulteration of milk in regard to animal species by means of several analytical methods.
- Effect of heat treatment on milk constituents
- Implementation of High Pressure on cows' and sheep milk
- Implementation of membrane technology (microfiltration) on cows' and sheep milk



- **1** national official method for detecting cows' milk in sheep/goat milk cheeses
- **32** publications

# CHEESE

- Cheese composition in relation to cheesemaking technology, ripening conditions and storage duration.
- Study of the ripening process of ripened cheese types, e.g. white-brined (Feta), pasta filata (Kasseri), Gruyere-type (Graviera Kritis).
- Specific experimentation on Feta cheese (cheesemilk, rennet, Feta-brine interactions)
- Study of non-ripened cheeses (Halloumi, fresh acid curd cheeses, whey cheeses)
- Improvement of the rennet production from small ruminants
- Implementation of High Pressure in cheese manufacture (in collaboration with NTUA)
- Evolution of sensory properties of various cheese varieties
- Implementation of various cheesemaking technologies for the development of new products with improved nutritional features, e.g. low fat cheeses, low fat and salt cheeses, probiotic acid curd cheese



**54 publications**

# YOGHURT/FERMENTED MILKS

- Development of yoghurts from various milk kinds and fortification schemes
- Yoghurt composition, bacterial profile, textural and sensory characteristics
- Effect of storage on yoghurt
- Goat milk yoghurt
- Improvement of biofunctional properties of set type yoghurt from cows' or goats' milk
- Development of new products, e.g. nonfat liquid yoghurt, fermented milk with whey protein hydrolysate



**10** publications

# WHEY

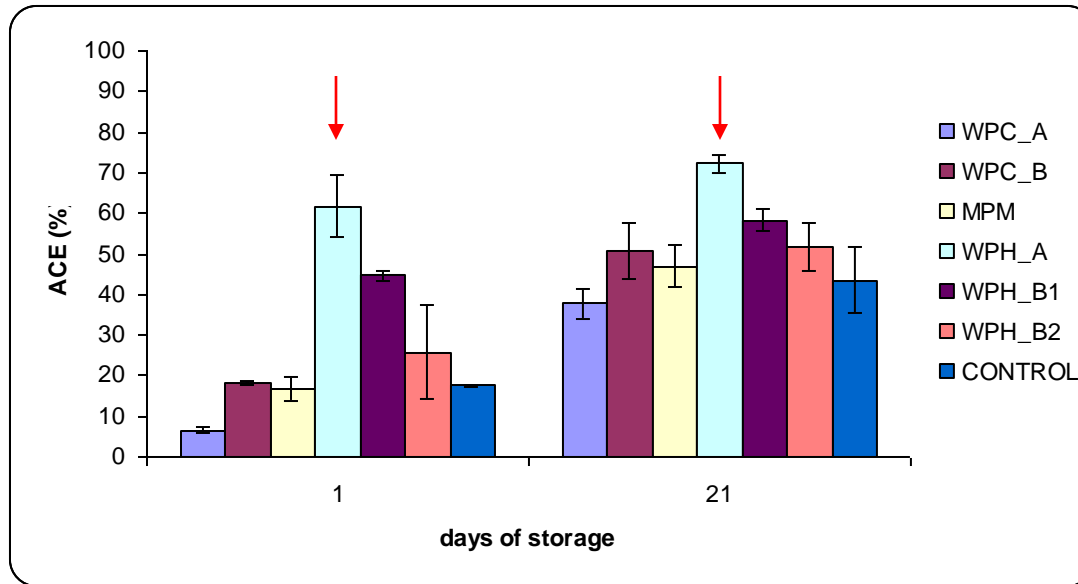
- Sweet and acid whey composition from various sources
- Study of whey proteins, especially those of milk from small ruminants
- Study of whey protein concentrates (WPCs) made from Feta whey.
- Development of whey protein hydrolysates with biofunctional properties, i.e. antioxidant and anti-hypertensive activity
- Production of whey cheeses



**8** publications

# Future Research

- Fractionation of whey proteins of sheep or goat milk using membrane technology
- **Improvement** of acid whey characteristics
- **Improvement** of cheese texture especially from small ruminant's cheesemilk
- **Development** of new cheese products with enhanced biofunctional properties
- **Development** of strained yoghurt with enhanced biofunctional properties
- Butter and related bioproducts
- Holistic approach of the properties of small ruminants' milk



**Anti-hypertensive activity of cow's milk yoghurt fortified with whey protein hydrolysates produced in our laboratory**

**Thank you for your attention!**