

# Realities of sheep artificial insemination on farm level: farm and breed differences

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**63<sup>rd</sup> Annual Meeting of EAAP**  
**Bratislava, Slovakia**  
**27-31 August, 2012**

# AI of sheep in Hungary

## Background

- Intensive growing in number of ewes and in ratio of ewes inseminated during 1950's and 1960's
- Top ratio in 1963 = 63% of ewes inseminated
- Slow decline until mid 1970's when the state owned ram stations and regional AI centres were closed
- Intensive decrease since then
- Nowadays only 2-3% of ewes in AI

# AI of sheep in Hungary

## Background

#2

- No special skill and / or education for AI of sheep
- Inseminators were skilled for cattle and pig during the last 20 years – mainly in state owned secondary schools
- one week courses for AI in sheep and goats for shepherds were organised by two NGO-s (H. Goat Breeders' Association; H. Sheep Dairying Association) in 1999 and 2000
- 3 courses 60 participants – with special exams and certificates - they knowledge could be used in their own farm / flock

# AI of sheep in Hungary

## Background

#3

- No education nowadays, old and elder shepherds forgot their knowledge in AI
- AI used on limited number of sheep (less than 20) and goat farms (two)
- Only some shepherd realised its value and importance
- There are two artificial insemination units in the country: one in a research station, and the other was a big sheep farm (now closed), from last year a new one started in Veterinary Faculty of Szent István University.

# AI of sheep in Hungary

## Background

#4

- Present size of Hungarian ewe population about 860 thousands heads
- Average flock size is 149 heads of ewes
- 6,600 sheep farms
- Merinos are dominant
- 20 different breeds are bred
- 3,000 goat farms; 44,000 she-goats, 7 breeds (4 imported ones)

# AI of sheep in Hungary

- The aims of study
  - To examine the use of AI on farm level
  - To learn the practice and the results of AI
  - To learn the education of persons making insemination in sheep
  - To learn the results of the organised AI courses
- The method
  - Data from 11 sheep farms of various sizes were collected and evaluated based on survey and personal consultation

# The farm sizes (No. of ewes)

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year											
2003	1960	3138	312	700	820		239	1160	588		420
2004	2120	2905	359	700	900		204	1168	456		390
2005	2140	2753	411	750	950		177	1183		430	350
2006	2200	2103	461	700	980		206	1157		450	380
2007	2080	2251	450	840	1050		216	988		470	380
2008		2170		834	960		237	1060		460	350
2009		971				1100	295	968		460	345
2010		588				980	290	940		450	340

# No. of inseminated ewes

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year											
2003	1960	2849	274	640	160		212	198	1058		420
2004	2120	2620	350	650	200		196	127	1078		390
2005	1760	2325	385	690	220		165		1124	33	350
2006	370	2103	317	600	350		151		1081	41	280
2007	50	2094		650	165		167		988	160	350
2008		2131		670	130		127		1060	186	300
2009		863				297	245		968	207	295
2010		579				369	255		940		



# Breeds kept on the farms

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year											
2003	2	8,9,10	1	6	1		7	7	1,5,6		3
2004	2	8,9,10	1	6	1		7	7	1,5,6		3
2005	2	8,9,10	1	6	1		7		1,5,6	1,3,4	3
2006	2	8,9,10	1	6	1		7		1,5,6	1,3,4	3
2007	2	8,9,10		6	1		7		1,5,6	1,3,4	3
2008		8,9,10		6	1		7		1,5,6	1,3,4	3
2009		8,9,10				7	7		1,5,6	1,3,4	3
2010		8,9,10				7	7		1,5,6	1,3,4	3

1 – Hungarian Merino

2 – Awassi (purebred and crossbred)

3 – British Milksheep (purebred and crossbred)

4 – Charollais

5 – German Blackhead Mutton Sheep

6 – German Mutton Merino

7 – Lacaune (purebred and crossbred)

8 – Bábolna Tetra

9 – Ile de France

10 – Suffolk

# Equipments for AI on farm



# Methods of sperm collection and use

- **transported sperm** from AI service company (farm No. 8.)
- AI made by **service company** after on-farm collection (farm No. 1.)
- **on-farm self-collection** (all other farms)

# Collecting semen



# Examination of ejaculation

- **visual** (farm No. 2, 6, 11)
- **visual + microscopic** (farm No. 3, 4, 5, 8, 9, 10)
- **visual+microscopic+morphological**  
(minimum control of deformed sperm)  
(farm No. 1, 7)

# Ratio of diluting semen

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
2003	3,5	1	1	1	5		7	5	1		1
2004	3,5	1	1	1	1		7	5	1		1
2005	3,5	1	1	1	1		7	1	1	3,5	1
2006	3,5	1	1	1	1		7	1	1	3,5	1
2007	3,5	1		1	1		6	1	1	3,5	1
2008		1		1	1		6	1	5	4	1
2009		1				6	6	1	5	4	1
2010		1				6	6	1	5	4	1

## Diluting rates:

1 – none

2 – 1:1

3 – 1:2

4 – 1:3

5 – 1:4

6 – 1:8

7 – 1:10

# Diluting liquids used

- **improved Salamon** (farm No. 1, 2, 5, 9 and 10)
- **own extender** (farm No. 6, 7, 8 - developed on No. 8)
- **other (none)** (farm No. 3, 4, 11)

# Dose of sperm in AI

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
2003	2	2	2	2	3		2	2	1		3
2004	2	2	2	2	2		2	2	1		3
2005	2	2	2	2	2		2		1	4	3
2006	2	2	2	2	2		2		1	4	3
2007	2	2		2	2		2		1	4	3
2008		2		2	2		2		1	3	3
2009		2				1	2		1	3	3
2010		2				1	2		1	3	3

1 – 0.1 ml

2 – 0.2 ml

3 – 0,3 ml

4 – 0.4 ml



# Searching ewes on heat

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
2003	1	1	2	2	1,2		1	1	1		2
2004	1	1	2	2	1,2		1	1	1		2
2005	1	1	2	2	1,2		1		1	2	2
2006	1	1	2	2	1,2		1		1,2	2	2
2007	1	2	2	2	1,2		1		1,2	2	1
2008		2			1,2		1		2	2	1
2009		2				2	1		2	2	1
2010		2				2	1		2	2	1

Method of choosing ewes:

1 – vasectomised ram

2 – teasing entire ram with apron cover

# Time of searching ewes on heat

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year											
2003	3	1	3,4	1	3,4		1	1	3,4		5
2004	3	1	3,4	1	3,4		1	1	3,4		5
2005	3	1	3,4	1	3,4		1		3,4	2	5
2006	3	1	3,4	1	3,4		1		3,4	2	5
2007	3	1		1	3,4		1		3,4	2	1
2008		1					1		1	2	1
2009		1				2	1		1	2	1
2010		1				2	1		1	2	1

- 1 – morning
- 2 – afternoon
- 3 – morning & afternoon
- 4 – afternoon & morning
- 5 – midday

# Time of AI

Farm	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
Year											
2003	3	3	3,4	3	3,4		3	1	1		4
2004	3	3	3,4	3	3,4		3	1	1		4
2005	3	3	3,4	3	3,4		3		1	5	2
2006	3	3	3,4	3	3,4		3		1	5	2
2007	3	3		3	3,4		3		1	5	2
2008		3		3	3,4		3		1	5	2
2009		3				3,4	3		1	5	2
2010		3				3,4	3		1	5	2

- 1 – morning only
- 2 – afternoon only
- 3 – morning & afternoon
- 4 – afternoon & morning
- 5 – morning & afternoon & morning

# Use of oestrus synchronisation

## Oestrus synchronisation used

- in **main season** and in **Spring** on farm No. 1 and 10,
- **only in Spring** on farm No. 5 and 7
- **only in winter** on farm No. 6
- **no synchronisation** used - all other farms

# Equipment and dosage of PMSG

## Equipment of synchronisation used

- “**Eazy-bred**” vaginal implant (produced in New Zealand), up to 2005
- vaginal sponge (**Chrono-Gest**) since 2005

## PMSG dosage

- **750 IU** on farm No. 1 – last two years **600 IU**
- **500 IU** farm No. 5, 6, 7
- **550 IU** farm No 10 – last four years **425 IU**

Fixing ewe for AI



# Fixing ewe for AI

## Fixing and holding method:

- **shepherds hold back legs** (farm No. 6 and 8) of the ewes
- **shepherds hold back legs on barrier** (all other farms)

# The performance of AI





# Methods of AI

## The deposition of semen

- **vaginal** (farm No. 8)
- **cervical** (farm No. 1, 2, 3, 4, 5, 9, 11)
- **cervico-uterinal** (farm No. 6, 7, 10, and sometimes 11) //with special catheter developed in Hungary 1974//
- **uterinal** – laparoscopy – not used

# Labour demand for AI inseminator + help

## Labour demand

- **1 inseminator + 1 catcher** (farm No. 2 (last years), 5, 7, 9, 10, 11)
- **1 inseminator + 2 catcher** (farm No. 2 (first 4 years) 3, 4, 6, 8)
- **2 inseminator + 5 catcher** (farm No. 1)

# Use of pregnancy test

## Pregnancy control:

- **none** (farm No. 4 and 7 /in last four years/)
- **ultrasonography** (farm No. 5, 7, 10)
- **rectal ultrasonography** (farm No. 1)
- **post-mating** one cycle after the AI for the period of two cycles (most of the farms)
- **no post-mating** after AI (farm No. 4, 5 and 7 /in last four years/)

# Results of AI

P – pregnancy; L – lambing; W – weaning

## Farm with more than one breed (No. 2)

Breed, trait, year	Bábolna Tetra			Ile de France			Suffolk		
	P%	L%	W%	P%	L%	W%	P%	L%	W%
2003	82.2 <sup>aA</sup>	1.7	82.2 <sup>aA</sup>	81.4 <sup>aA</sup>	1.2	85.8 <sup>bcA</sup>	76.9 <sup>aA</sup>	1.4	86.4 <sup>acA</sup>
2004	86.1 <sup>aB</sup>	1.8	86.0 <sup>aB</sup>	83.3 <sup>aA</sup>	1.3	84.3 <sup>acAC</sup>	73.9 <sup>bAB</sup>	1.7	79.9 <sup>bcA</sup>
2005	87.3 <sup>aBE</sup>	1.7	94.2 <sup>aC</sup>	90.4 <sup>bB</sup>	1.3	91.1 <sup>bcB</sup>	66.3 <sup>cB</sup>	1.5	93.2 <sup>acB</sup>
2006	79.4 <sup>aC</sup>	1.7	83.7 <sup>aA</sup>	92.2 <sup>bB</sup>	1.2	88.7 <sup>bcAB</sup>	77.4 <sup>aA</sup>	1.4	85.4 <sup>acA</sup>
2007	79.7 <sup>aAC</sup>	1.6	88.5 <sup>aD</sup>	79.6 <sup>aA</sup>	1.3	87.1 <sup>aA</sup>	80.4 <sup>aA</sup>	1.2	68.4 <sup>bc</sup>
2008	73.1 <sup>aD</sup>	1.7	84.4 <sup>aAB</sup>	94.6 <sup>bC</sup>	1.3	83.3 <sup>aAC</sup>	79.6 <sup>cA</sup>	1.4	81.8 <sup>aA</sup>
2009	90.7 <sup>aE</sup>	2.0	97.8 <sup>aDE</sup>	84.7 <sup>bD</sup>	1.2	87.9 <sup>aAD</sup>	85.7 <sup>C</sup>	1.3	86.9 <sup>aAD</sup>
2010	86.7 <sup>aABE</sup>	1.9	82.3 <sup>aA</sup>	90.3 <sup>aB</sup>	1.4	81.8 <sup>aA</sup>	83.2 <sup>aA</sup>	1.5	82.1 <sup>aA</sup>

## Farm with more than one breed (No. 9)

Breed, trait, year	Hungarian Merino			German Mutton Merino			German Blackheaded Mutton Sheep		
	P%	L%	W%	P%	L%	W%	P%	L%	W%
2003	89.5 <sup>aA</sup>	1.6	96.4 <sup>aA</sup>	92.2 <sup>aA</sup>	1.7	95.9 <sup>aA</sup>	87.9 <sup>aA</sup>	1.8	96.7 <sup>aA</sup>
2004	92.4 <sup>aAC</sup>	1.6	97.4 <sup>aA</sup>	93.9 <sup>aAB</sup>	1.6	96.7 <sup>aA</sup>	85.5 <sup>bA</sup>	1.7	95.4 <sup>aA</sup>
2005	90.4 <sup>aAC</sup>	1.7	97.2 <sup>aA</sup>	93.1 <sup>aA</sup>	1.7	96.6 <sup>aA</sup>	91.8 <sup>aAC</sup>	1.8	95.3 <sup>aA</sup>
2006	97.5 <sup>aB</sup>	1.5	96.6 <sup>aA</sup>	96.3 <sup>aB</sup>	1.7	95.8 <sup>aA</sup>	89.9 <sup>bAC</sup>	1.8	94.9 <sup>aA</sup>
2007	91.4 <sup>aAC</sup>	1.7	94.9 <sup>aAB</sup>	92.8 <sup>aA</sup>	1.6	95.0 <sup>aA</sup>	95.2 <sup>aBC</sup>	1.8	93.0 <sup>aA</sup>
2008	93.1 <sup>aC</sup>	1.7	96.3 <sup>aA</sup>	93.7 <sup>aA</sup>	1.6	95.4 <sup>aA</sup>	94.4 <sup>aBC</sup>	1.7	94.3 <sup>aA</sup>
2009	94.6 <sup>aAC</sup>	1.7	96.6 <sup>aA</sup>	93.4 <sup>aA</sup>	1.8	95.3 <sup>acA</sup>	90.7 <sup>aAC</sup>	1.5	93.3 <sup>bcA</sup>
2010	96.4 <sup>aB</sup>	1.6	95.1 <sup>aAB</sup>	93.5 <sup>aA</sup>	1.7	95.3 <sup>aA</sup>	92.9 <sup>aAC</sup>	1.7	94.6 <sup>aA</sup>



## Farm with more than one breed (No 11)

Breed, trait, year	British Milksheep			British Milksheep Crossbreds		
	P%	L%	W%	P%	L%	W%
2003	93.3 <sup>A</sup>	2.2	82.4 <sup>A</sup>	-	-	-
2004	88.5 <sup>B</sup>	2.1	87.8 <sup>B</sup>	-	-	-
2005	82.9 <sup>CD</sup>	2.1	92.1 <sup>C</sup>	-	-	-
2006	87.5 <sup>BD</sup>	2.0	94.9 <sup>CD</sup>	-	-	-
2007	78.6 <sup>aCD</sup>	2.0	88.9 <sup>aBC</sup>	78.6 <sup>aA</sup>	1.9	98.0 <sup>bA</sup>
2008	83.3 <sup>aBD</sup>	2.1	94.1 <sup>aCD</sup>	83.3 <sup>aA</sup>	2.0	93.9 <sup>aA</sup>
2009	83.0 <sup>aBC</sup>	2.3	96.7 <sup>aD</sup>	75.0 <sup>aA</sup>	2.4	98.2 <sup>aA</sup>
2010	85.7 <sup>BC</sup>	2.4	98.4 <sup>D</sup>	*	*	*



## The pregnancy rate (%) on farms with one breed

Farm	#1	#3	#4	#5	#6	#7	#8
Year							
2003	37.3 <sup>a</sup>	83.2 <sup>a</sup>	84.4 <sup>a</sup>	75.0 <sup>a</sup>	-	95.3 <sup>a</sup>	58.6 <sup>a</sup>
2004	35.0 <sup>a</sup>	93.4 <sup>b</sup>	83.8 <sup>a</sup>	67.5 <sup>ac</sup>	-	85.2 <sup>b</sup>	66.1 <sup>a</sup>
2005	45.0 <sup>b</sup>	67.0 <sup>c</sup>	87.0 <sup>ab</sup>	78.6 <sup>ab</sup>	-	81.8 <sup>b</sup>	-
2006	56.8 <sup>c</sup>	83.0 <sup>a</sup>	86.7 <sup>a</sup>	62.9 <sup>bc</sup>	-	96.7 <sup>a</sup>	-
2007	80.0 <sup>d</sup>	-	84.3 <sup>a</sup>	66.7 <sup>a</sup>	-	97.6 <sup>a</sup>	-
2008	-	-	81.0 <sup>ac</sup>	61.5 <sup>acd</sup>	-	82.7 <sup>b</sup>	-
2009	-	-	-	-	88.2	79.6 <sup>b</sup>	-

### On farms

No 1 – purebred and crossbred Awassi; No. 3 and 4 Hungarian Merino;

No. 5 – German Mutton Merino; No. 7 and 8 - Lacaune

## The lambing rate (%) on farms with one breed

Farm	#1	#3	#4	#5	#6	#7	#8
Year							
2003	1.3	1.4	1.4	1.5		1.4	1.6
2004	1.3	1.3	1.4	1.5		1.6	1.6
2005	1.3	1.3	1.4	1.5		1.5	
2006	1.3	1.4	1.4	1.4		1.6	
2007	1.3		1.5	1.2		1.5	
2008			1.5	1.2		1.4	
2009					1.5	1.6	

### On farms

No 1 – purebred and crossbred Awassi; No. 3 and 4 Hungarian Merino;  
No. 5 – German Mutton Merino; No. 7 and 8 - Lacaune

# Cost of AI (estimated, € / ewe)

Fram / year	#1 *	#2	#3	#4	#5 *	#6 *	#7 *	#8	#9	#10 *	#11
2003	3.70	0.74	1.48	0.37	0.74	-	3.70	0.93	1.85	-	-
2004	3.70	0.74	1.67	0.37*	0.74		3.70	1.11	1.85	0.37	0.37
2005	3.70	0.74	1.85	0.37	0.93		3.70	1.30	-	0.37	0.37
2006	3.70	0.74	1.85	0.37	1.11		3.70	1.30	-	0.37	0.37
2007	5.56	0.74	-	0.37	1.11		3.70	1.30	-	0.37	0.37
2008	-	0.74	-	0.37	1.30		3.70	1.85	-	0.37	0.37
2009	-	0.74	-	-	-	0.37	3.70	1.85	-	0.37	0.37
2010	-	0.74	-	-	-	0.37	3.70	1.85	-	0.37	0.37

\*in the case of oestrus synchronisation the cost increased by €7-8.5

# Conclusions

- The AI could be done with good reason on farm level with every day practice
- Well skilled shepherd could inseminate with better result than veterinary
- Most of shepherds do not use dilution and synchronisation
- The costs of AI much lower than keeping rams all around the year

Thank you very much for your attention!



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