

Artificial Insemination of Small Ruminants in Turkey: Current Status, Techniques, and Outcomes

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Current Global human population

- 8,2 billion
(2025)
- Census Bureau Projects
World Populations on New
Year's Day
- <https://www.statista.com/statistics/262879/countries-with-the-largest-population/#:~:text=Global%20population,will%20then%20go%20into%20decline.>



Expected Global Human Population in 2050

9.1 billion

How to Feed the World in 2050

https://www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf

The highest consumed animal proteins in the world



Sheep

15,9 million tonnes



Poultry

133 million tonnes



Fish

162,5 million tonnes



Goats

6,4 million tonnes



Cattle

72 million tonnes



Pigs

120 million tonnes

<https://www.fao.org/poultry-production-products/production/en/>

<https://www.fao.org/newsroom/detail/fao-report-global-fisheries-and-aquaculture-production-reaches-a-new-record-high/en>

<https://data.un.org/Data.aspx?d=FAO&f=itemCode%3a1017>

<https://data.un.org/Data.aspx?d=FAO&f=itemCode%3a867>

<https://data.un.org/Data.aspx?d=FAO&f=itemCode%3a1035>

<https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/os-markets/mla-mi-global-industry-trade-report-sheep.pdf?>

Current global population of food animals



Sheep: approx. 1.3 billion



Goats: approx. 1 billion



Cattle: approx. 1.5 billion



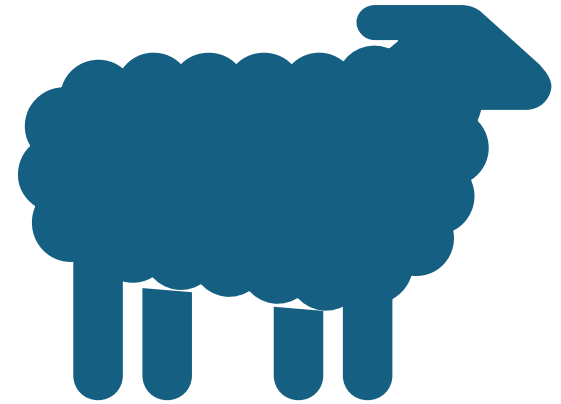
Pigs: approx. 1 billion



The Importance of Sheep Farming in Türkiye

Current population of sheep in the Türkiye (2024)

- 43,9 million



The Current Status of Sheep Farming in Türkiye

- Meat
- **2023 Production**

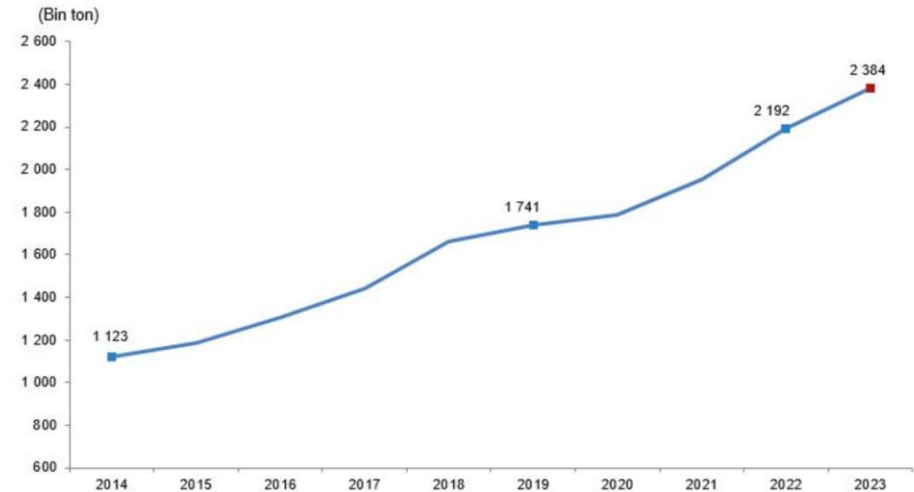


Kırmızı et üretimi ve değişim oranları, 2022, 2023

		Red meat production and change rates, 2022, 2023		(Ton)
		2022	2023	Değişim (%)
Toplam	Total	2 191 625	2 384 047	8,8
Sığır	Cattle	1 572 747	1 670 606	6,2
Koyun	Sheep	489 354	569 066	16,3
Keçi	Goat	115 938	128 989	11,3
Manda	Buffalo	13 586	15 386	13,3

Son on yıla ilişkin kırmızı et üretim tahminleri incelendiğinde, toplam kırmızı et üretiminin 2014 yılında 1 milyon 123 bin 59 ton iken 2023 yılında 2 milyon 384 bin 47 tona ulaştığı görüldü.

Kırmızı et üretim miktarı, 2014-2023 Red meat production level, 2014-2023



The Current Status of Sheep Farming in Türkiye

- Milk
- **2024 Production**

Çiğ süt üretimi, 2023, 2024

Raw milk production, 2023, 2024

	2023	2024	(Ton)
			Değişim (%)
Toplam Total	21 481 567	22 487 757	4,7
İnek Cattle	19 961 908	21 040 442	5,4
Manda Buffalo	43 025	58 122	35,1
Koyun Sheep	933 576	906 945	-2,9
Keçi Goat	543 058	482 247	-11,2

Çiğ süt üretiminin 2024 yılında %93,6'sını inek sütü, %4'ünü koyun sütü, %2,1'sini keçi sütü ve %0,3'ünü manda sütü oluşturdu.

The Current Status of Sheep Farming in Türkiye

- Wool
- **2021 Production:**
- **2022 Production:**



The Current Status of Sheep Farming in Türkiye

- Sheepskin



Table 1. Some descriptive statistics of sheep presence by regions

Region	Number of races	Total number of sheep	Share in Türkiye (%)	Number of sheep in the provinces in the region	
				The province with the least sheep	The province with the most sheep
Aegean	43	5.298.59	12.07	1.933.18	5.298.59
Mediterranean	48	3.599.19	8.20	1.267.39	3.599.19
Marmara	45	4.332.82	9.87	2.160.63	4.332.82
Black Sea	33	2.261.71	5.15	1.071.76	2.261.71
Southeastern Anatolia	30	6.468.77	14.74	3.118.12	6.468.77
Eastern Anatolia	23	11.803.38	26.89	6.382.28	11.803.38
Central Anatolia	46	10.125.45	23.07	6.499.14	10.125.45
Türkiye	53*	43.889.92	100.00		

* It is the total number of races existing in Turkey, the races in each region vary.

Major breeds of sheeps in Türkiye

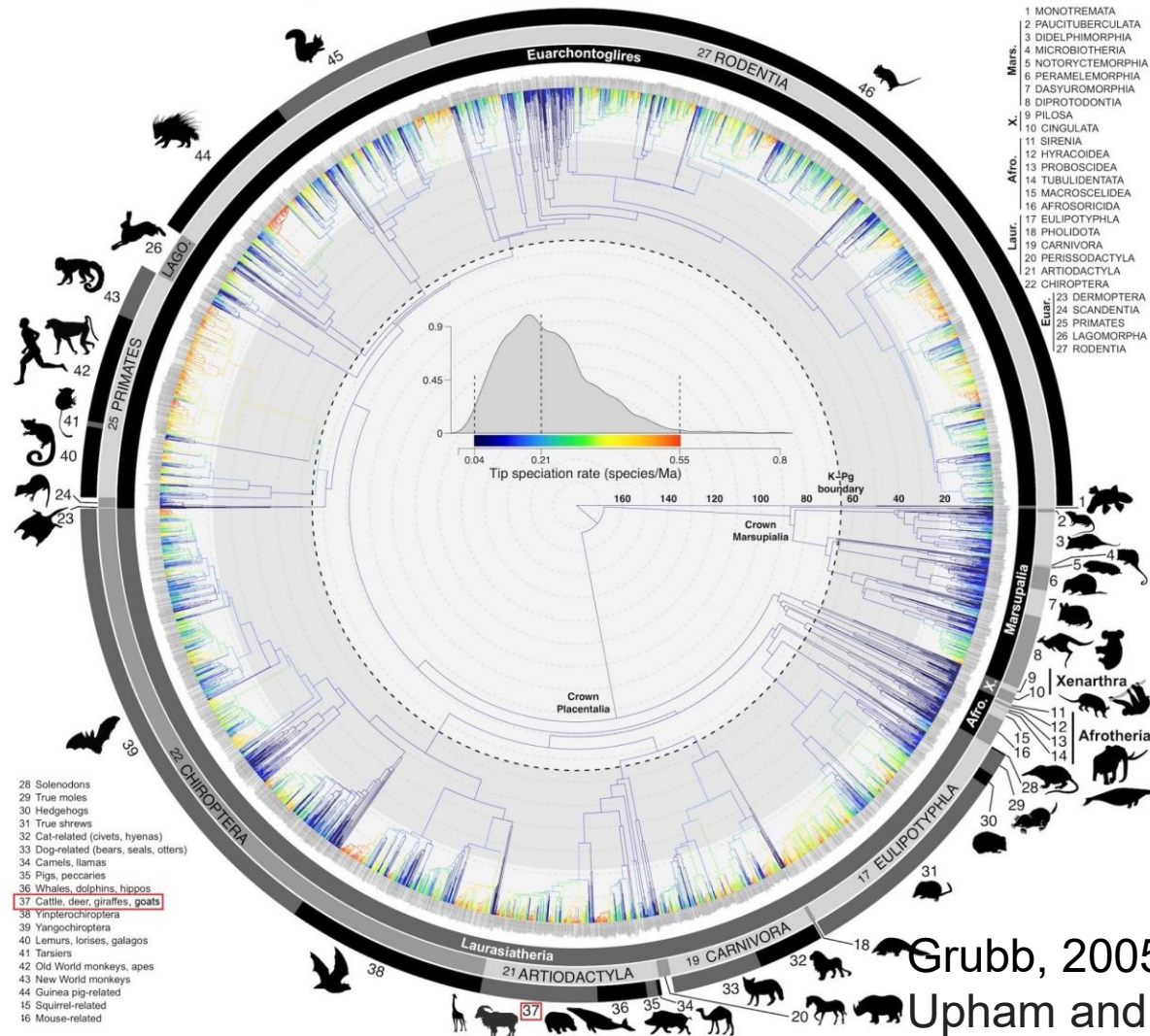
- Meat sheep breeds:
Akkaraman,
Morkaraman, Dağlıç
- Dairy sheep breeds:
Awassi, Chios, Assaf,
Lacaune, East Friesian
- Wool sheep breeds:
Merinos, Karacabey
Merinos, Kıvrıcık



Table 2. Sheep breeds raised in Türkiye.

Breed	Presence	Rate	Breed	Presence	Rate
Acıpayam	9.579	0.02	Kıvrıcık (3)	3.870.648	8.82
Akkaraman (1)	17.940.185	40.88	Koçeri	54.608	0.12
Alman Siyah Bas	8.184	0.02	Lacaune	8.405	0.02
Anadolu Merinosu	331.402	0.76	Langhe	279	0.0005
Assaf	868	0.00	Malya	18.623	0.04
Bafra	28.931	0.07	Menemen	23.622	0.05
Bandırma	732	0.00	Merinos (4)	3.698.157	8.43
Bergamasca	19	0.00	Mor Karaman (2)	5.124.472	11.68
Çine Çapari	73.427	0.17	Norduz Koyunu	33.451	0.08
Dağlıç	128.831	0.29	Orta Ana Merinosu	120.394	0.27
Doğu Friz (Mars)	3.967	0.01	Ödemiş	1.250	0.003
Dorper	7.226	0.02	Pırlak	2.722.164	6.20
Esme	137.395	0.31	Plevne	2.393	0.01
Gökçeada	112.666	0.26	Polatlı	7.133	0.02
Hamdani	1.677.950	3.82	Ramlıç	53.241	0.12
Hasak	1.023	0.00	Romanov	98.890	0.23
Hasmer	1.199	0.00	Sakız	1.506.754	3.43
Hemşin	237.350	0.54	Sarole	6.045	0.01
Herik	72.082	0.16	Sönmez	10.292	0.02
Ile de Frans	26.578	0.06	Suffolk	18.550	0.04
İvesi (5)	3.002.326	6.84	Tahirova	155.309	0.35
Kangal Akkaraman	568.288	1.29	Teksel	2.253	0.01
Karacabey Merinosu	368.275	0.84	Tuj	32.156	0.07
Karagül	8.771	0.02	Turcana	4.288	0.01
Karakas	7.076	0.02	Türkgeldi	281	0.0005
Karayaka	1.153.923	2.63	Zom	308.768	0.70
Karya	99.239	0.23	TÜRKİYE	43.889.918	100.00

Phylogeny of the Mammals



Grubb, 2005

Upham and Esselstyn 2019

Sheeps

Domain: Eukaryota
Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Artiodactyla
Family: Bovidae
Subfamily: Caprinae
Tribe: Caprini
Genus: Ovis
Species: Ovis aries

Goats

Domain: Eukaryota
Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Artiodactyla
Family: Bovidae
Subfamily: Caprinae
Tribe: Caprini
Genus: Capra
Species: Capra Hircus

Cattles

Domain: Eukaryota
Kingdom: Animalia
Phylum: Chordata
Class: Mammalia
Order: Artiodactyla
Family: Bovidae
Subfamily: Bovinae
Genus: Bos
Species: Bos Taurus

The background of the slide features several out-of-focus, colorful spheres. The most prominent sphere in the center-left is a vibrant blue with a textured, almost crystalline surface. It is surrounded by other spheres in shades of red, orange, and yellow, all set against a dark, gradient background that transitions from deep blue to black.

Artificial Insemination in Ewes

Benefits of artificial insemination (AI) in sheep

Detection of Ewes in Estrus

Maximizing the Use of High-Value Rams

Evaluation and Selection of Semen Quality

Reduction in the Need to Maintain Multiple Rams

Prevention of Microbial Contamination

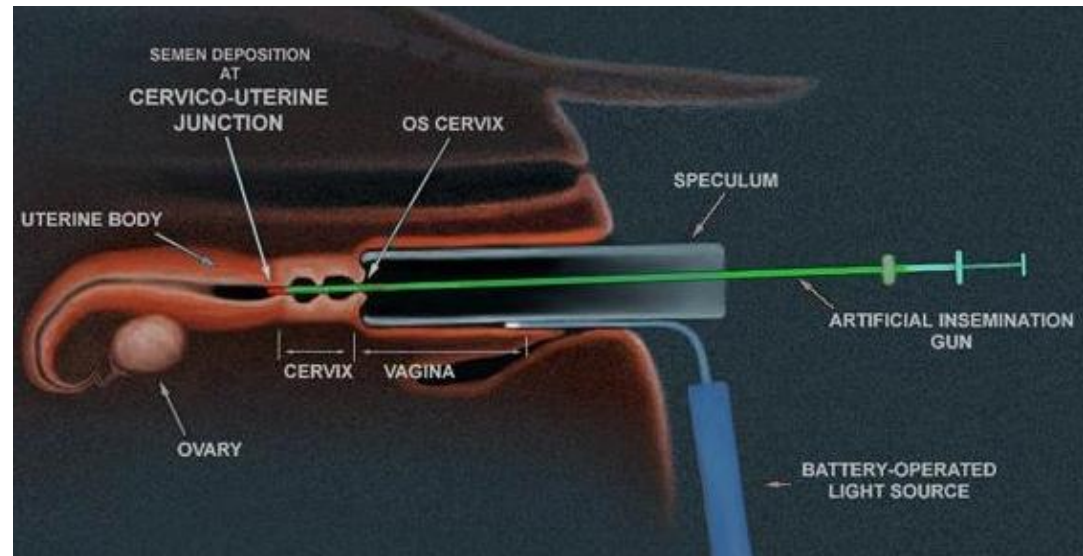
Ensuring Each Ewe is Inseminated

Facilitation of Genetic Improvement

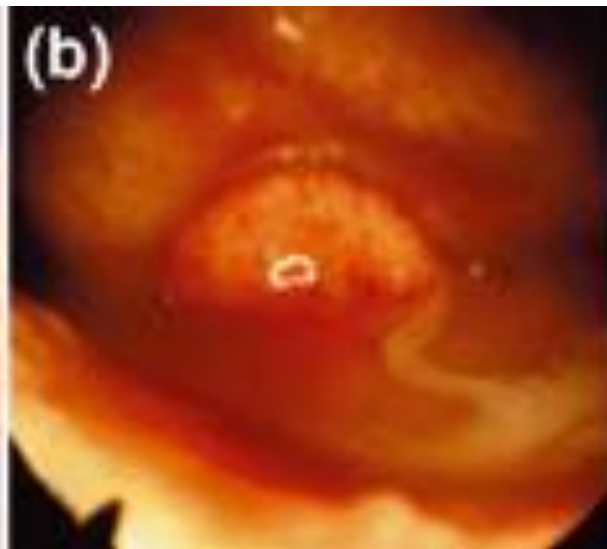
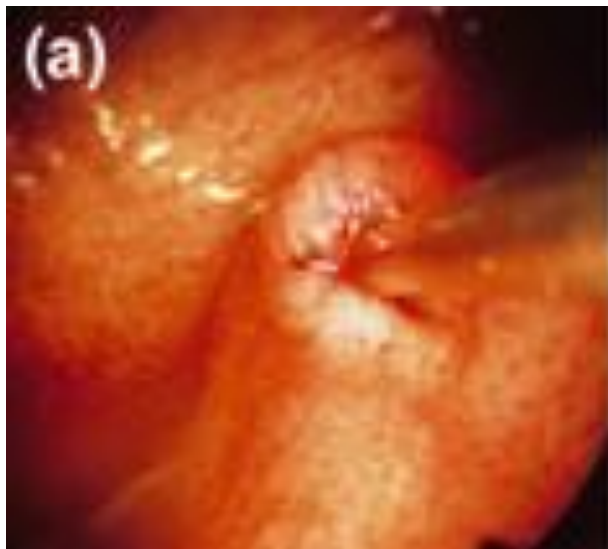
Opportunities for Scientific Research

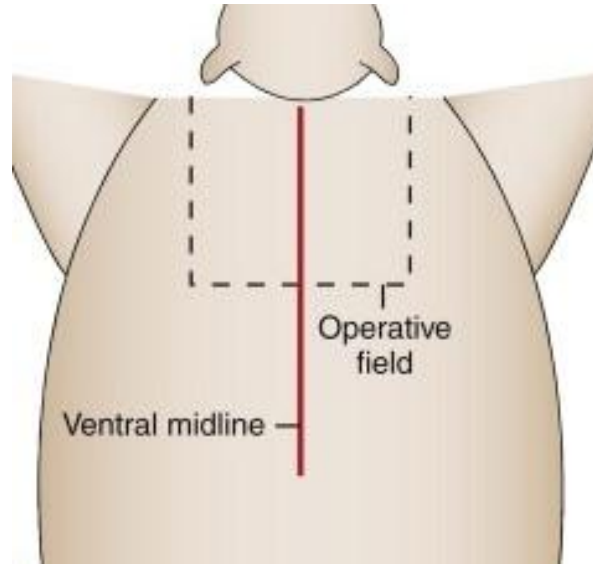
Artificial Insemination Techniques in Sheep

Vaginal and Transcervical Insemination

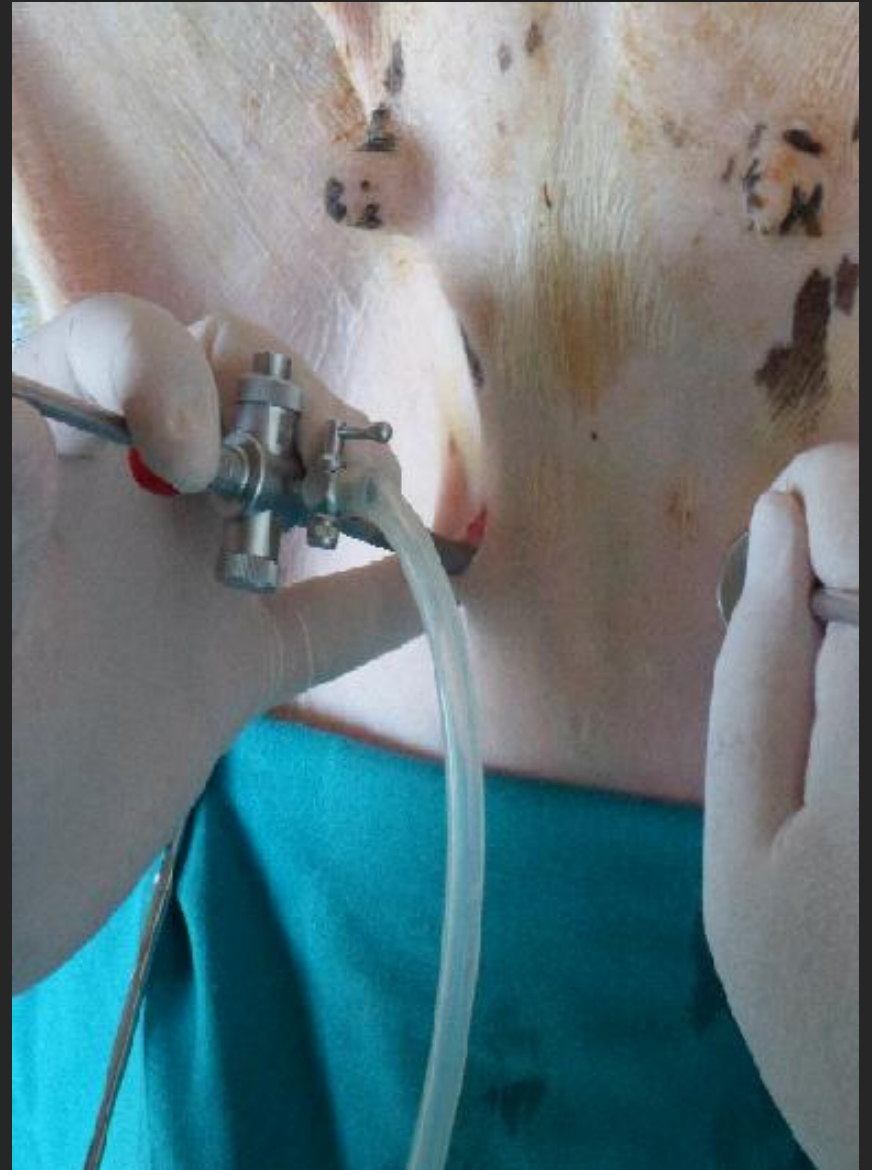








Laparoscopic Insemination





Factors affect success of artificial insemination

For Males

- Motility
- Mass Activity
- Sperm Concentration
- Sperm Morphology
- Extenders

For Females

- Body Condition Score (BCS)
- Age and Reproductive History

Environmental and Managerial Factors

- Climatic Conditions
- Nutrition and Housing

Technician Skill and Experience

Estrus Synchronization Protocols

A vertical strip on the left side of the slide features a laboratory background. It shows several glass pipettes with yellow caps, each with a drop of clear liquid hanging from its tip. Below the pipettes is a multi-well microplate containing a pinkish-purple liquid. The background of the slide is a light gray.

Conclusions

A tool for genetic improvement and flock productivity

Semen quality + ewe physiology

Environmental conditions & technician skill

Synchronization is crucial with frozen semen

Parameter control is essential for pregnancy

Success = physiology + environment + expertise

Future Perspectives

Biotechnological
innovations

AI-based estrus
prediction &
monitoring

Precision
livestock farming
(PLF) tools

Genomic
selection &
molecular
breeding

Climate-resilient
genetic lines

Certified & well-
trained
technicians

Protocol
standardization

Data-driven,
individualized
management



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