**Ovis aries**

**System:** Terrestrial

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Phylum</th>
<th>Class</th>
<th>Order</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animalia</td>
<td>Chordata</td>
<td>Mammalia</td>
<td>Artiodactyla</td>
<td>Bovidae</td>
</tr>
</tbody>
</table>

**Common name**

sheep (English), mouflon (English)

**Synonym**

*Ovis aries musimon*, Pallas, 1762  
*Ovis aries ophion*, Blyth, 1841  
*Ovis musimon*, Pallas, 1762  
*Ovis musimon musimon*, Pallas, 1762  
*Ovis musimon ophion*, Blyth, 1841  
*Ovis ophion*, Blyth, 1841  
*Ovis orientalis*, Gmelin, 1774

**Similar species**

**Summary**

Ovis aries (sheep) are an ungulate mammal believed to have originated in Europe. While humans have domesticated the majority of sheep, feral populations exist. These populations are causing impacts on the native diversity of plant species, especially on islands. The impact their grazing has on vegetation is known to cause declines in rare and endangered bird species and other native ungulate species.

[view this species on IUCN Red List](http://www.iucngisd.org/gisd/species.php?sc=843)

**Species Description**

There exist over 200 distinct breeds of sheep *Ovis aries*. The breeds differ in their physical characteristics. Female sheep tend to be smaller than males by a quarter to one third of male size- head and body length 1,200-1,800mm and shoulder height 650-1,270mm. *O. aries* have a vertical cleft and narrow snout completely covered with short hair except on the margins of the nostrils and lips. Wild *O. aries* have tails between 70-150mm but in domestic *O. aries* tails may be larger and used as a fat reserve, although these long tails are removed on most commercial farms. The skulls of domesticated *O. aries* differ from those of wild sheep in that the eye socket and brain case are reduced. The genus *Ovis* is characterized by the presence of glands situated in a shallow depression in the lacrimal bone, the groin area, and between the two main toes of the foot. These glands secrete a clear semi-fluid substance that gives domestic *O. aries* their characteristic smell. Selection for economically important traits has produced domestic *O. aries* with or without wool, horns and external ears. Colouration ranges from milky white to dark brown and black (Reavill, 2000).
Uses
Reavill (2000) observes that, “Sheep (Ovis aries) is one of the most economically significant species on the planet. Since their domestication between 9000 and 11000 years ago they have been a source of meat, milk, wool and hides in nearly every country. In some cultures O. aries are considered highly useful as a sacrificial animal. The versatility of the species contributes to its economic significance as large herds of animals can be maintained in many environments at relatively low costs. Besides their usefulness in an agricultural sense, O. aries have become important as a tool for scientific research. Because of their large size and low maintenance costs they make an ideal model for a great deal of scientific research.”

Habitat Description
Sheep (Ovis aries) are extremely versatile and exist in a wide variety of habitats worldwide ranging from temperate mountain forests to desert conditions (Grzimek 1990, MacDonald 1984 in Reavill, 2000).

Reproduction
Sheep (Ovis aries) breeds on a seasonal basis, determined by day length, with females (ewes) first becoming fertile in the early fall and remaining fertile through midwinter. Estrus cycles range between 14 and 20 days with 17 as the average. Females are in heat on average for 30 hours. Males (rams) are fertile year round and most domestic sheep breeders use 1 ram to 25 to 35 ewes. Gestation averages 148 days with most lambs born in mid spring. One or two lambs, which are able to stand and suckle within a few minutes of birth, are born to each ewe. Both male and female lambs reach sexual maturity within one year. (Ensminger 1965 in Reavill 2000). Réale et al. (2000) states that, "Although humans have modified the rutting and lambing seasons of O. aries, some feral populations show highly synchronized estrus and lambing periods that relate to latitude (Jewell 1989 ). These herds were assumed to have recovered that synchrony because of the high adaptive value of spring lambing." 

Nutrition
Sheep (Ovis aries) are extremely hardy animals and can survive on a diet consisting of only cellulose, starch or sugars as an energy source and a nitrogen source which need not be protein. In general, O. aries feed mainly on grasses while in pastures and can be fed a wide variety of hays and oats. Considerable research has been done on sheep nutritional requirements, and feed substitution tables are present in Ensminger's 1965 "The Stockman's Handbook". Grazing O. aries ingest a large amount of food in a short time, then retire to rest and rechew the ingested matter. O. aries spend their day alternating between these periods of grazing and ruminating. O. aries has a large and complex stomach which is able to digest highly fibrous foods that can not be digested by many other animals. Its modest nutritional requirements contribute to its economic significance.(Hecker 1983, Ensminger 1965 in Reavill 2000).
General Impacts
Establishment of feral herbivores like sheep (Ovis aries) have had significant ecological impacts on island ecosystems. Island ecosystems are particularly vulnerable to herbivores as insular plants in these ecosystems evolved largely in the absence of large herbivores, therefore lacking in defences against them. Increased bare ground followed by increased erosion are some of the other impacts (Van Vuren and Coblentz, 1987). Van Vuren and Coblentz (1987) in their study on the ecological effects of feral sheep on Santa Cruz Island, California observe that feral sheep are forage generalists when compared to domestic sheep on mainland. Feral sheep diet include annual grasses, forbs and also a substantial quantity of shrubs. The authors summarise the ecological impacts of feral sheep: consumption of endemic species by feral sheep could potentially cause decline in their population levels; loss of vegetation due to trampling while grazing; compaction of the soil and therefore changes in the soil structure; soil erosion due to removal of vegetation and denudation of the soil; removal of herbaceous vegetation caused changes in the grassland community, reduction of litter and a decline in the recruitment of seedlings. Alteration in the plant community led to decrease in species diversity. Grazing and browning of herbaceous vegetation, and stripping of bark by feral sheep and other introduced mammals (cattle (Bos taurus), Mouflon sheep (Ovis musimon), and feral goats (Capra hircus)) have led to exposure of soil to erosion and degradation of forests on Mauna Kea (Scowcraft and Sakai 1983). Welsh (2002) adds that, "O. aries are extensive and destructive herbivores. They have been found to decrease populations of the mamane (Sophora chrysophylla), an endemic leguminous tree, by stripping the bark off thus facilitating damage from insects and and other disease causing organisms". Results of a study (Scowcroft and Giffen 1983) which evaluated the regeneration of vegetation and forests inside and outside sheep exclosures located in heavily browsed portions of the mamane forest of Mauna Kea, indicated feral sheep browsing suppresses regeneration of mamane and three other endemic species, Hawaiian bent, heu-pueo, and aheahea. Liu and Jiang (2004) report that, "The most important food competitor of the critically endangered Przewalski's gazelle (see Procapra przewalskii in IUCN Red List of Threatened Species) is the domestic Tibetan sheep (O. aries) in the steppe and deserts around Qinghai Lake on the Qinghai-Tibet Plateau." Kirby et al. (2004) state that, "The sheep tick Ixodes ricinus (L.) is an ectoparasite of major economic and pathogenic importance in Scotland. Its distribution in the Scottish uplands is assumed to be governed by the abundance and distribution of its definitive hosts (deer and O. aries) and climatic variables such as temperature and rainfall."
Management Info

Preventative measures: Risk Assessment models for assessing the risk that exotic vertebrates could establish in Australia have been further explored by the Western Australia Department of Agriculture & Food (DAFWA) to confirm that they reasonably predict public safety, establishment and pest risks across a full range of exotic species and risk levels. The Risk assessment for the Domestic Sheep (Ovis aries), has been assigned a VPC Threat Category of EXTREME.

Mammals and birds were assessed for the pest risk they pose if introduced to Australia, by calculating Vertebrate Pests Committee (VPC) Threat Categories. These categories incorporate risk of establishing populations in the wild, risk of causing public harm, and risk of becoming a pest (eg causing agricultural damage, competing with native fauna, etc). The 7-factor Australian Bird and Mammal Model was used for these assessments.

Physical: Management strategies for sheep (O. aries) include hunting and the use of fencing to keep animals out (Welsh, 2002). Due to the behavioural similarities between sheep and goats (see Capra hircus), management strategies and hunting techniques for goats work equally well for sheep, although some minor variations may be required for each technique (this is also the case with goats, depending on vegetation, terrain, naivety). Please see Campbell & Donlan, 2005; Parkes et al. 1996 and Daly & Goriup, 1987 for more details on management strategies and hunting techniques for goats. Trapping of sheep at waterpoints or other limited resources (e.g. salt licks in some areas) can be highly effective. Please see O'Dempsey, 1993 for methods.

The use of Judas sheep as a hunting method could be applied quite easily; sheep are highly social animals and will search for conspecifics when isolated. Techniques like sterilisation, termination of pregnancy and inducing a prolonged estrus in goats for increasing their efficacy as Judas goats could be adapted for sheep. Epididymectomy can be conducted efficiently in rams with the procedures indicted for male goats. Tubal occlusion could similarly be applied in ewes as described for does. Pregnancy termination in the ewe isn't as straight-forward as it is in goats. In the first 55 days of pregnancy, abortion can be induced with prostaglandins (6 mg PGF2alpha / 58kg body weight), after 55 days pregnancy termination with prostglandins is unlikely (Stellflug et al. 1997). Incorporating cesarean section with sterilisation procedures may be the most effective means of ensuring pregnancy is terminated prior to deployment of Judas sheep. The procedure for cesarean section on sheep is outlined by Mobini et al. 2002.

(Karl Campbell., pers.comm., September 2005).


Compiler: IUCN SSC Invasive Species Specialist Group

Updates with support from the Overseas Territories Environmental Programme (OTEP) project XOT603, a joint project with the Cayman Islands Government - Department of Environment

Review: Dr Dirk Van Vuren Professor and Department Chair Wildlife, Fish, & Conservation Biology University of California Davis USA

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ALIEN RANGE
Full Account for: Ovis aries

Red List assessed species 103: EX = 3; EW = 2; CR = 22; EN = 35; VU = 16; NT = 20; LR/nt = 1; DD = 2; LC = 2;

Androcymbium psammophilum VU
Anogramma ascensionis CR
Antechinomys laniger LC
Aphelocoma insularis NT
Aratinga brevipes EN
Ardeotis australis NT
Argyrocephalus kauense CR
Argyrocephalus sandwicense VU
Atelognathus praebasalticus EN
Atelognathus reverberii EN
Begonia samhaensis EN
Bencomia extipl nugentii VU
Brassica oleracea DD
Brassica rupestris NT
Brassica villosa NT
Centaura princeps EN
Certhilauda burra VU
Chaeropus ecaudatus EX
Cicer canariense EN
Couchites hispidus EX
Ctenomys sociabilis CR
Darevskia clarkorum EN
Echium handiense CR
Diomedea epomophora VU
Frankenia portulacifolia VU
Fritillaria conica EN
Fritillaria epiroica EN
Helix valentini EN
Haematopus chathamensis EN
Hymenolaimus malacorhynchos EN
Horstrissea dolinicola CR
Juniperus standleyi EN
Iguana delicatissima EN
Ledebouria insularis EN
Lasiorhinus krefftii CR
Leontodon siculus NT
Leipoa ocellata VU
Leporillus apicalis CR
Leporillus conditor VU
Leptodactylus megacephalus CR
Loxioides bailleui CR
Macaca sylvanus EN
Microcavia shiptoni NT
Mastichophis anthonyi CR
Mimulus graysoni CR
Microtus guatemalensis NT
Montivipera bornmuelleri EN
Myadestes obscurus VU
Nerodia ovata CR
Oldenlandia adscensionis EX
Onychogalea fraenata EN
Oreomystis mana EN
Origanum cordifolium VU
Pardalotus quadragintus EN
Parvilacerta frasii EN
Pelecanus crispus CR
Perameles gunnii NT
Pletinckia longicaudata VU
Pluvianellus socialis NT
Podiceps gallardoi EN
Pomarea mendozae EN
Potentilla emili-popoi DD
Pomarea samhaensis EN
Procopara przewalski EN

FULL ACCOUNT FOR: Ovis aries

Procellaria westlandica  VU
Pteris adscensionis  CR
Pterodroma sandwichensis  VU
Puffinus opisthomelas  NT
Rupicapra rupicapra  LC
Salvia herbanica  CR
Silene nocteolens  CR
Solenanthus albicanus  EN
Sorbus arranensis  VU
Sterna albostriata  EN
Todiramphus godeffroyi  CR
Tyrannus sissonii  NT
Tympanuchus cupido  CR
Vermivora crissalis  EN
Viper a darevskii  CR
Viper a loti  NT
Zenaida graysoni  EW

Pseudomys australis  VU
Pterodroma madeira  EN
Puffinus auricularis  CR
Ribes sardoum  CR
Ruprechia apetala  LR/nt
Sceloporus exsul  CR
Sminthopsis douglasi  NT
Somuncuria somuncuresis  CR
Stemmacantha cyanoides  EN
Thinornis rubricollis  NT
Torreornis inexpectata  EN
Turnix castanotus  NT
Urosaurus auriculatus  EN
Vini ultramarina  EN
Viper eriwanensis  VU
Zavattariornis stresemanni  EN

BIBLIOGRAPHY
36 references found for Ovis aries

Management information
Bellchambers, K., 2004. Improving the development of effective and humane trapping systems as a control method for feral goats in Australia.

Summary: The World Bird Database provides the information management tool through which the BirdLife Partnership manages, analyses and reports on the breadth of its scientific knowledge - Species, Important Bird Areas (IBAs) and Endemic Bird Areas (EBAs)? much of these data are available through the Data Zone. You can search for detailed information on Species, Sites and EBAs, see examples of recent analyses and download subsets of the database.
Information on some 10,000 species of bird, over 8,000 IBAs and 218 EBAs is managed through the WBDB, together with BirdLife’s spatial data, multimedia files, other documents and links. The database is available from:
http://www.birdlife.org/datazone/index.html
This page is available from:
Summary: This compilation of information sources can be sorted on keywords for example: Baits & Lures, Non Target Species, Eradication, Monitoring, Risk Assessment, Weeds, Herbicides etc. This compilation is at present in Excel format, this will be web-enabled as a searchable database shortly. This version of the database has been developed by the IUCN SSC ISSG as part of an Overseas Territories Environmental Programme funded project XOT603 in partnership with the Cayman Islands Government - Department of Environment. The compilation is a work under progress, the ISSG will manage, maintain and enhance the database with current and newly published information, reports, journal articles etc.

Summary: A study documenting the transmission of tick born diseases by sheep.


Summary: Eradication case study in Turning the tide: the eradication of invasive species.


Summary: This report documents work contributing to a project commissioned by the Invasive Animals Cooperative Research Centre to validate and refine risk assessment models used in decisions to import and manage introduced vertebrate species. The intent of the project was to: a) increase predictive accuracy, scientific validation and adoption of risk assessment models for the import and keeping of exotic vertebrates, and b) reduce the risk of new vertebrate pests establishing introduced populations in Australia.


O’Dempsey, N 1993, Sheep self mustering - muster in your sleep, Information series QI93026, Agdex 430/75, Queensland Department of Primary Industries, Charleville, Queensland.

Page, Amanda; Win Kirkpatrick and Marion Massam, February 2009, Domestic Sheep (Ovis aries) risk assessment for Australia. Department of Agriculture and Food, Western Australia.

Summary: Models for assessing the risk that exotic vertebrates could establish in Australia have been developed for mammals, birds (Bomford 2003; Bomford 2006, 2008), reptiles and amphibians (Bomford 2006, 2008; Bomford et al. 2005). These Risk Assessment models have been further explored by Western Australia Department of Agriculture & Food (DAFWA) to confirm that they reasonably predict public safety, establishment and pest risks across a full range of exotic species and risk levels. Mammals and birds were assessed for the pest risk they pose if introduced to Australia, by calculating Vertebrate Pests Committee (VPC) Threat Categories. These categories incorporate risk of establishing populations in the wild, risk of causing public harm, and risk of becoming a pest (eg causing agricultural damage, competing with native fauna, etc). The 7-factor Australian Bird and Mammal Model was used for these assessments.


Summary: A comprehensive review of the history and biology of feral goats in Australia, the damage they cause, and community attitudes to feral goat management. A wide range of strategies for goat control are discussed and recommended.


Summary: A newspaper article documenting legal barriers and problems that occured in Hawaii eradicating populations of feral sheep.


Summary: Official U.S. document placing Argyroxiphium kauense on the endangered species list. Includes the impacts sheep have had on the species.


Summary: This database compiles information on alien species from British Overseas Territories.

Available from: http://www.jncc.gov.uk/page-3660 [Accessed 10 November 2009]


Summary: A brief species account documenting distribution and management actions.


General information


**Spanish:** La lista de especies del Sistema de informaci?n sobre especies invasoras de M?xico cuenta actualmente con informaci?n acerca de nombre cient?fico, familia, grupo y nombre com?n, as?, como ?bitat, estado de la invasi?n en M?xico, rutas de introducci?n y ?litas a otros sitios especializados. Algunas de las especies de mayor riesgo ya tienen una liga directa a la p?gina de alertas. Es importante realear que estas listas se encuentran en constante proceso de actualizaci?n, por favor consulte la portada ([http://www.conabio.gob.mx/invasoras/index.php/Portada](http://www.conabio.gob.mx/invasoras/index.php/Portada)), en la secci?n de novedades, para conocer los cambios.


**Summary:** A paper that documents the impact of sheep on a threatened species.


**Summary:** Available from: [http://www.rarebreeds.co.nz/ferals.html](http://www.rarebreeds.co.nz/ferals.html) [Accessed 7 October 2004].


**Summary:** A general species account that covers the history, description, biology, and impacts of species. Available from: [http://animaldiversity.ummz.umich.edu/site/accounts/information/Ovis_aries.html](http://animaldiversity.ummz.umich.edu/site/accounts/information/Ovis_aries.html) [Accessed 7 October 2004].


**Summary:** A study documenting the impacts sheep are having on a threatened Hawaiian species of bird.