

Vladimir Dinets. Countability of domesticated mammals.

The status of various domestic/feral/secondarily wild mammals is usually a complex issue, and their scientific taxonomy is often a total mess, so it's not surprising that many mammal watchers struggle with the questions of countability. It might take a while until universally acceptable approaches emerge (if they ever do).

As a starting point for the discussion, I have listed my personal opinions on what is countable and what is not. It is not a simple "yes" or "no" dichotomy, and I don't expect anyone to automatically follow my opinion (although I'd be flattered if somebody does). My general approach is that for each species of questionable countability, I try to see some representatives of the "most countable" population.

Part of the problem is that there is no universal terminology. For this particular discussion, I'll use the following terms:

actively managed: fully controlled and likely dependent on human support (including predator removal) for survival.

commensal: dependent on human-created food sources for survival, and limited to urban, agricultural and other artificial habitats.

feral: occurring in both modified and relatively natural habitats, but likely dependent on the former for long-term survival, or likely dependent on predator control by humans.

secondarily wild: fully independent on human presence, long established, and showing signs of natural evolution as a fully wild taxon.

countable and **non-countable:** in all cases where these words are used, they refer to my personal opinion only.

I will list domesticated forms that are highly modified and/or of mostly hybrid or unclear origin as full species, and others as subspecies. This is not always consistent with current ICZN policy. Please don't use this essay as an authoritative treatise of taxonomy.

Species list

Dog (*Canis familiaris*). Almost certainly the oldest domesticated mammal, it differs from its nearest relative, the Gray Wolf (*C. lupus*) in many aspects of its morphology, physiology and natural history. Moreover, there is growing evidence that the two forms have split *before* the domestication of the dog. Dogs and wolves interbreed in many areas of allopatry, but the hybridization is suppressed to various degree, and seems to be more common in places where either wolf numbers are unnaturally low, or local dog breeds already have a lot of wolf blood. The intraspecific taxonomy is also controversial. I recognize three subspecies:

1. Dingo-type Dog (*C. f. dingo*). Exists as commensal and feral populations over much of tropical Asia, and as secondarily wild populations in Australia and North America (I've also

heard claims of such populations in Southeast Asia, but don't know any details). Actively managed populations include a few so-called "primitive breeds" in Asia and Africa. Feral dogs of this subspecies gradually reverse to dingo-like rather than wolf-like appearance. Mainland Australian dingos now increasingly show signs of hybridization with *C. f. familiaris*, but the ones on Frazer Island and in the deserts of the interior appear to be still pure, and are fully countable. The last secondarily wild population in the Americas, the Carolina Dog, might be extinct, although I saw one in 2007.

2. Singing Dog (*C. f. hallstromi*). A secondarily wild population endemic to New Guinea; possibly extinct in the wild.

3. Western-type Dog (*C. f. familiaris*). Includes almost all named domestic breeds. Might be best characterized as a hybrid swarm originating from *C. lupus* and *C. f. dingo*; some breeds are very wolf-like. Feral dogs of this subspecies do not reverse to dingo-like appearance over time. There is plenty of commensal and feral populations, but the only ones I know for sure to be secondarily wild are those on four islands in the Galapagos, now eradicated on Isabela, Floreana and San Cristobal and replaced by feral and commensal dogs on Santa Cruz.

Ferret (*Mustela putorius furo*). Domestic ferrets show only minor differences from wild European polecats, so I don't see any reason to count them separately. Of the introduced populations, the ones on Shetland Is. reportedly originate from domestic ferrets, the one in New Zealand is of mixed origin, and the ones on Mediterranean islands are descendants of wild polecats.

Domestic Cat (*Felis lybica catus*). Clearly a descendant of the Wildcat, and quickly reverses to wildcat-like appearance when feral or secondarily wild. Most domestic breeds are of Middle Eastern origin, but some appear to have had some input from European or Indian subspecies. There are millions of cats in commensal and feral populations, but the only secondarily wild ones that I know of are in Australia and on numerous islands, i. e. on Kunashir I. and the Galapagos. I don't see any reason to count them separately from *F. lybica*.

Human (*Homo sapiens*). This species is often called semi-domesticated. If you accept this point of view, the only truly domestic individuals are slaves; most others are either actively managed, commensal, or feral. Fully wild populations live in remote areas of South America, Central Africa, New Guinea and the Andaman Islands (although some anthropologists believe that all forest tribes of South America are secondarily wild). If you don't believe in the self-domestication concept, you can count any human, preferably from Sub-Saharan Africa (other populations have been affected by ancient hybridization with *H. neanderthalensis* and other forms that could be considered separate species or subspecies).

Domestic pig (*Sus scrofa*). Domestic pigs are so similar to wild boars and so frequently hybridize with them in most areas of allopatry that they probably can't be considered even a separate subspecies. Pigs in parts of Indonesia are claimed to be hybrids with *S. barbatus*, but I've never seen any evidence of this. There's plenty of introduced populations that are now secondarily wild; those in the Americas are of mixed domestic pig-wild boar origin, but the ones in Australia and New Zealand are reportedly purely ex-domestics. North American pigs do well

in areas where the Red Wolf (*Canis rufus*) is present, but it remains to be seen if they can survive recolonization of their Pacific Coast range by the Gray Wolf.

Reindeer (*Rangifer tarandus*). Although domesticated a very long time ago, domestic reindeer are only slightly different from wild ones, and have never been given even a subspecific name. Some populations in Eurasia appear to have had large input from domestic herds. The only secondarily wild population I know of is on the island of South Georgia.

Domestic Cattle (*Bos primigenius taurus* and *B. p. indicus*, a. k. a. Zebu). Originates from various subspecies of the Auroch. A few Asian breeds are of hybrid origin (with Yak, Banteng or Gaur, see below). There are many managed herds, and numerous commensal and feral ones. Some cattle in western USA appear secondarily wild, but it is unclear if they'll survive the recolonization of their range by the Gray Wolf. There are secondarily wild populations on some islands, i. e. Hawaii, the Aleutians and the Galapagos; at least one of them (on Tres Marias Is., Mexico) is of Zebu type. In the early 20th century there was an attempt to recreate the appearance of the now-extinct European Auroch (*B. p. primigenis*) by mixing and selectively breeding a few domestic breeds. The success was only limited; the result is called Heck cattle and has formed feral populations in a few nature reserves (600 in Oostvaardersplassen in the Netherlands). There are now ongoing projects in various places in Europe aiming at creating more Auroch-like animals. The intermediate result, called Taurus cattle, already looks impressive (see Wikipedia article), and can be seen in a few European reserves. There is a good chance that some of these herds will become secondarily wild in our lifetime, and they will be the most countable of all cattle.

Bali Cattle (*Bos javanicus domesticus*) is a domestic form of the Banteng. Secondarily wild populations exist in Australia, where they have pretty much reversed to “wild” Banteng appearance.

Gayal (*Bos frontalis*) is a domestic form resulting from hybridization of Gaur (*B. gaurus*) with domestic cattle of Western and zebu types. I am not aware of any feral or secondarily wild populations that could be considered countable.

Domestic Yak (*Bos mutus grunniens*) is a dwarf form of Wild Yak. I am not aware of any feral or secondarily wild populations, which is a good thing, because counting a domestic as equal to the majestic Wild Yak would be outright pathetic. Domestic Yaks in forested parts of eastern Tibet and Nepal are often Dzo (hybrids with Domestic Cattle of Western and Zebu types).

Domestic Buffalo (*Bubalus bubalis*) is generally considered a descendant of Wild Buffalo (*B. arnee*), but looks very different and doesn't revert to “wild” appearance when feral; there is also some evidence of limited hybridization in allopatry. There are actually two types that should have scientific names but don't: River Buffalo of Southern Asia (probably a descendant of Wild Buffalo) and Swamp Buffalo of Southeastern Asia and China (probably a descendant of some extinct species). Secondarily wild populations of Swamp Buffalo exist in many parts of Indonesia (i. e. in Komodo and Baluran National Parks) and also in Australia. Secondarily wild herds of River Buffalo reportedly exist in Argentina and Bolivia. In Sri Lanka there are apparently two forms, one representing an undescribed subspecies of Wild Buffalo and the other

being secondarily feral River Buffalo, but the issue is highly controversial. The former can be seen, for example, in Yala National Park, and the latter is the only form present in Minneriya National Park. Interestingly, Tamaraw (*B. mindorensis*) of Mindoro Island appears to have the same wild ancestor as the Swamp Buffalo, and the two might even be considered conspecific.

Domestic Sheep (*Ovis aries*) have complex origins, with the main ancestor being either Asian Mouflon (*O. orientalis*), some extinct Middle Eastern form, or some form of European Mouflon. The status of the so-called European Mouflon (*O. o. musimon*, originally from Corsica and Sardinia, and *O. o. ophion* from Cyprus) is not entirely clear: they appear to originate from ancient introductions of domestic sheep, in which case their proper names should be *O. a. musimon* and *O. a. ophion*. Numerous introduced mouflons outside Europe (i. e. on Hawaii, in Texas, on Kerguelen, in the Andes, on Grand Comoro etc.) are mostly hybrids between European Mouflon and Domestic Sheep. Secondarily wild Domestic Sheep exist in New Zealand and on some predator-free islands in Europe, notably on St. Kilda. There are also small feral herds in Utah and possibly elsewhere in USA, but their ability to survive once Gray Wolf recolonizes their range is questionable.

Domestic Goat (*Capra aegargus hircus*) is now known to originate from Bezoar Ibex with no input of other species. Secondarily wild populations occur on many islands, and also in Australia.

Bactrian Camel (*Camelus bactrianus*) is now known to be genetically distinct from Wild Camel of the Gobi (*C. ferus*); there are rumors that small secondarily wild herds found in remote deserts of southwestern Kazakhstan might actually be remnants of the wild population. Secondarily wild Bactrian Camels reportedly occur also in Indian Kashmir.

Dromedary Camel (*C. dromedarius*) has surprisingly limited fossil history, and the original range of the wild form (now extinct) is unknown, although often claimed to include only the Arabian Peninsula or also the northern parts of the Horn of Africa. Secondarily wild herds are widespread in Australia and also occur in Afar region of Ethiopia and Somalia; the latter might be more countable as it occurs within the possible native range.

Llama (*Lama glama*) is a highly modified descendant of **Guanaco** (*L. guanicoe*). To my knowledge, all herds are actively managed. Feral llamas are rumored to have once occurred on Isla del Sol in Lake Titicaca, but are extinct.

Alpaca (*Vicugna pacos*) is a highly modified descendant of **Vicuña** (*V. vicugna*). To my knowledge, all herds are actively managed.

Domestic Horse (*Equus ferus caballus*) originates from one-four extinct subspecies of Tarpan, with no input from Przevalski's Horse (*E. f. przewalskii*). Steppe Tarpan (*E. f. ferus*) and Forest Tarpan (*E. f. sylvestris*) became extinct in the 19th century (some think there was only one subspecies). I strongly suspect that there was a third subspecies in the Middle East that also got domesticated, and possibly yet another one in northern China. Feral or secondarily wild herds of Domestic Horse exist in many parts of the world, most notably in western USA. Attempts to create horses similar to Tarpan resulted in producing two primitive-looking breeds, Polish Konik

and Heck's Horse. Both are widely introduced to nature reserves throughout Europe, but to my knowledge all herds are actively managed or feral, with the possible exception of the one in Bialowieza Forest, Poland. There is some data suggesting that Exmoor pony might be the closest breed to Tarpan. Some of their herds might be feral.

Donkey (*E. africanus asinus*) originated from African Wild Ass, supposedly from the recently extinct Nubian subspecies (*E. a. africanus*). In a surprising twist, secondarily wild donkeys of Bonaire were recently found to be genetically and phenotypically identical to Nubian Wild Ass, but the study didn't look at any other domestic populations and the results might be meaningless. Other secondarily wild populations occur in western USA (where some herds also look a lot like Nubian Wild Ass), Australia and possibly elsewhere.

Domestic Rabbit (*Oryctolagus cuniculus*) exists in a variety of breeds, some very weird-looking, but still fully reverts to wild phenotype in secondarily wild populations. There are hundreds of those on predator-free islands worldwide, as well as in many cities (north to Valdez, Alaska and Helsinki), in Australia, Chile and many parts of Europe, but in most cases it is unknown if the founders were wild or domestic.

Guinea Pig (*Cavia porcellus*) is a descendant of Montane Guinea Pig (*C. tschudii*), although it is likely that Shiny Guinea Pig (*C. fulgida*) was also involved. A population originally described as Bogota Guinea Pig (*C. anomalae*) is now believed to be a secondarily wild population of *C. porcellus*; it occurs in Parque la Florida in Bogota, among other locations. Another form, Guiana Guinea Pig (*C. guianae*) is often said to be of similar origin, but in my experience it is a lot more similar to the Brazilian Guinea Pig (*C. aperea*).

House Mouse (*Mus musculus*) is the most numerous domestic mammal, and one of the most widely introduced. 3-5 subspecies might be considered full species; this would render most introduced populations uncountable due to unknown or mixed origin. The highest genetic diversity of house mice is found in the area stretching from Turkey to Western Nepal, where they are often found in various natural habitats far from human settlements. Interestingly, four out of five occur in Afghanistan. *M. m. domesticus* is the form widely distributed in Western Europe, the Middle East and Northern Africa. Probably the "wildest" mice of this type I've ever seen occur in pistachio savannas of Badkhyz Nature Reserve in Turkmenistan and in similar habitats around Herat, Afghanistan. *M. m. musculus* occurs from Scandinavia to Korea, but likely originated in northern Afghanistan and southern Turkestan, where it is still common in riparian forests. *M. m. castaneus* occurs from Afghanistan to Indochina; I haven't seen any speculation about its native range, but I suspect that it was in the floodplains of modern-day Pakistan and northern India. The only time I saw it far from human settlements was in Keoladeo Ghana National Park, India. *M. m. bactrianus* is a rare, pale form known from intermontane valleys of Afghanistan; it occurs in Band-i-Amir National Park. *M. m. gentilulus*, a small form, is known from Arabia and Madagascar; it is not well differentiated genetically and probably shouldn't be considered full species under any species concept. North American house mice were long considered to be pure *domesticus*, but recently *castaneus* has been found in California.