

## GOAT FACTS...



Afghan female laborers work at a traditional cashmere factory in Herat city, west of the capital Kabul, Afghanistan. Not so long ago, Afghan farmers collected the thick winter undercoat their goats shed every spring and threw it on the fire to heat their homes and cook their food. Some have since learned that the super-soft fluff that comes off in clumps as the weather warms up, once cleaned, refined and spun into yarn is cashmere - a luxury product that finds customers as far away as the United States, Britain and Europe. (AP Photo/Massoud Hossaini)

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A dozen weed-munching special guests were invited to an Esquimalt park this week to help celebrate Earth Day. “Goats love to chew on invasive plants like blackberries, ivy, Scotch broom and weeds — even more than grass,” said Beverly Ness, co-owner of the Parksville business Goats on the Hoof. The goats were at Esquimalt’s Highrock Park on Wednesday and Thursday as part of a community effort to weed out invasive species and plant native trees. Plants such as broom, Himalayan blackberry, daphne, English ivy and holly threaten the park’s Garry oak ecosystem, the city said. Mayor Barb Desjardins and drummers from Rockheights Middle School kicked off the cleanup Wednesday with a celebration. On Thursday, the park was packed with young people, many from nearby schools and daycares, lending a hand. “[The goats] spent six hours clearing out a good area,” Ness said. “They’re animals, so they chew for a bit and then lie down. They’ll work dusk to dawn.” Ness’s goats have travelled all over the Island helping clean out invasive plants on properties, but this was their first trip to the Victoria area. “It’s environmental, sustainable and it makes people happy to see them,” Ness said.

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## The Right Chemistry: What a goat's terrible odour teaches us about fragrances



Think of a ghastly smell. Skunk? Halitosis? BO? Outhouse? Rotting fish? Rancid butter? Dog flatus? Decomposing flesh? All devastating. But let’s not forget the penetrating fragrance of a billy goat. Especially a wet one. That will horrify any nose. Unless that billy goat, or buck in more scientific terms, happens to be castrated. Along with the loss of manhood comes the loss of smell. Actually “smell” doesn’t do the aroma justice. “Reek” is a better description of the unforgettable stench. And if you handle one of these animals, you will learn what “unforgettable” means. The piercing odour sticks to clothes and skin and is very tough to eliminate. You don’t want to be wearing clothes you are fond of when you have an encounter of the male goat kind.

Since “wethers,” as males that have been deprived of their testes are known, produce no smell, it stands to reason that the aroma of an intact male has a connection to reproduction. That has actually been demonstrated. When exposed to the **scent of a male goat**, females will ovulate and

become receptive to the advances of the buck. Determining the exact composition of the scent that activates the female is of interest to researchers because it may lead to a way of ensuring that females are in rut for breeding. This could be a more economical and a less invasive way of stimulating ovulation than hormone treatments now used by some breeders. Obviously, the first step in such research is to collect a sample of the scent. Although the identity of the brave scientist who first carried out the pioneering research has been lost to the pages of history, it is known that the scent is wafted out from glands on the billy's head.

So how do you collect the fragrant compounds? You design a helmet equipped with a material that absorbs volatiles, extract these with a solvent, and subject the solution to analysis by gas chromatography and mass spectrometry. A gas chromatograph separates the components of a mixture and a mass spectrometer can identify the individual compounds. And there are lots! Dozens!

Determining which are responsible for stimulating ovulation in the female is a challenge, one that was cleverly met by a group of Japanese researchers. By implanting electrodes in a specific area of the brain of female goats, they managed to measure electrical signals associated with the firing of nerve cells that are involved in the release of the hormones that stimulate ovulation. Starting with mixtures of compounds, and then narrowing these down to fewer and fewer components, they eventually managed to determine that 4-ethyloctanal produced the strongest response. It now joins the array of compounds recognized as "pheromones," namely chemicals secreted by animals that influence the behaviour or physiology of others of the same species. Interestingly, 4-ethyloctanal has a rather pleasant citrus-like odour.

While this compound has not been found in nature before, it has long been familiar to perfumers and artificial flavour manufacturers. A patent back in 2002 was filed for the use of 4-ethyloctanal as a fragrance chemical to enhance the bouquet of perfumes, toilet waters, colognes and other personal products, as well as for its use as a food additive to boost flavour. If 4-ethyloctanal isn't responsible for the torturous stench of male goats, what is? The chromatographic analysis reveals a number of compounds in the family of carboxylic acids. These are widespread in nature, the simplest ones being formic acid found in ant venom and acetic acid, a dilute solution of which we know as vinegar.

"Simple" in this case refers to the number of carbon atoms in the acid's molecular structure, with putridity increasing with the number of carbons. Propionic acid, which has three carbons, elicits the sensation of body odour, which is not surprising since it is produced by bacteria on the skin. Butyric acid is responsible for the characteristic smell of human vomit. It is also found in goat scent. As disturbing as it is, it pales in comparison with the stabbing odour of the six-carbon, caproic acid, appropriately deriving its name from "caper," the Latin for goat. Two other acids, caprylic and capric, also derive their names from "caper," for good reason. They also contribute to the fragrance of male goats. Staying away from randy old goats is a good idea. Unless they have been deprived of their privates.

*Joe Schwarcz is director of McGill University's Office for Science & Society ([mcgill.ca/oss](http://mcgill.ca/oss)).*

**Origins of the Goat**

Goats were one of the first animals to be tamed by humans and were being herded 9,000 years ago. They are a member of the cattle family and are believed to be descended from the wild goat, bezoar.