Everything You Ever Wanted to Know About the Smelly Stuff...

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It has many names: scat, droppings, feces, dung, stool, road apples, number two, pellets, caca, and manure but poop is poop anyway you say it. This packet will take you on poop’s fascinating journey from its beginnings to the variety of ways that it is used by both animals and humans.

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Frequently Asked Poop Questions

What is poop?
Poop is made of things that the body needs to get rid of, like food that the body can’t break down, old blood cells, bacteria, and bile.

What makes poop smell?
Poop contains millions of bacteria. These bacteria produce organic compounds that make poop smell.

What gives poop its color?
The brownish color of poop comes from bile (a digestive juice), worn-out red blood cells, and a mixture of food leftovers. If an animal eats a lot of something that is colorful, the colorful food sometimes results in colorful poop. When blue whales eat a lot of pink shrimp, they make a lot of pink poop!

Why do some animals poop while they eat?
Eating stimulates the involuntary action known as peristalsis. The smooth muscles in the esophagus and intestines contract and relax, moving food along the digestive system. Put simply, poop coming out one end makes room for more food coming in the other end.

Why do some animals eat poop?
Animals eat poop for several reasons:
- Koalas, elephants, bats, etc. have special organisms in their digestive systems called microbes. These microbes help break down hard-to-digest food. These animals’ babies aren’t born with microbes, and eat their parents’ poop to establish them in their digestive systems.

- Animals also eat their poop or their babies’ poop to hide the scent of the poop from predators. This way, when a predator comes along, they won’t smell that an animal has just been there.

- Sometimes the nutrients that animals eat aren’t completely digested the first time through. This is especially true for herbivores, because plants are more difficult than meat to digest. Rabbits, for example, always eat their food twice to make sure that they get as much as they can out of what they eat. Some animals eat others’ poop because it is easier to eat poop than to find their own food.

Why is some poop runny and other poop dry?
How wet or dry poop is depends on how much water is in the poop. Camels drink very little water, so their poop is very, very dry. Cows love to drink water, so their poop is very wet.
Digestion
Different animals digest their food in different ways, but the basics of digestion are the same:
- Food enters the body and is broken down.
- Food’s nutrients are used to fuel the body.
- Waste is pushed out of the body.

Meat-eating animals are called **carnivores**.
Carnivore poop contains hair, fur, feathers and bone.
Carnivores eat and poop less because meat digests faster than plant material.

Animals that eat both plants and meat are called **omnivores**.
Bears, pigs, raccoons, skunks, chimpanzees, mice and humans are considered to be omnivores.
Omnivore poop contains both plant and animal remains.

**Carnivores** and **omnivores** have only one stomach and digest their food like this:
- Food enters the mouth, is mashed up, mixed with saliva and swallowed.
- Food is squeezed down the esophagus into the stomach where it is mixed with chemicals to break it down into tiny pieces.
- Food is pushed into the small intestines where the nutrients are absorbed into the body.
- The leftovers travel to the large intestines where excess water and salt are removed.
- Now called feces, the waste collect in the rectum and pass out of the body through the anus.

Plant-eating animals are called **herbivores**.
Herbivore poop contains plant materials like grass and seeds.
Plants are harder to digest, so herbivores spend most of their time eating and pooping.

Herbivores come in two different varieties: **ruminant** and **non-ruminant**.

**Ruminant herbivores**, including cattle, goats, sheep, camels, llamas, giraffe, alpacas, bison, yaks, buffalo, deer, wildebeest, and antelope, have four stomachs and digest their food like this:
- Food enters the mouth, is quickly mashed up, mixed with saliva and swallowed.
- Food enters the first stomach called
the rumen, ferments and is regurgitated for a second chewing (chewing cud).
-Once food is swallowed for a second time it travels to the second stomach called the reticulum, which filters out indigestible matter.
-The omasum is the third stomach that further breaks down food and absorbs some of the food’s water into the body.
-The last stomach, called the abomasums, continues to break down the food and mixes it with acid.
-The small intestines absorb more nutrients and the large intestines absorb more water creating feces that are moved to the rectum and expelled through the anus.

**Non-ruminant herbivores**, including zebras, hippopotamuses, horses, hamsters, sloths, and rabbits, have only one stomach and digest their food like this:
- Food enters the mouth, is chewed and swallowed.
- Food travels down the oesophagus into the stomach where it is mixed with chemicals to break it down into tiny pieces.
- Food is pushed into the small intestines where more chemicals are added and food is broken into smaller particles, some nutrients are absorbed into the body.
- Food particles are then sent to a large sack called the cecum, where bacteria further break down the particles and more nutrient absorption occurs.
- Bacteria continue to break down the food particles as they enter the large intestine or colon where more nutrients are absorbed and excess water is removed.
- Now called feces, the leftovers collect in the rectum and pass out of the body through the anus.

Some non-ruminant herbivores cannot digest all of the nutrients from the food they eat the first time it goes through. Therefore, they send their food through a second time by eating their own poop. This is called **coprophagy**. Rabbits, capybaras and guinea pigs are just some of the herbivores that practice coprophagy.
Animals With One Waste Exit
All birds, amphibians, and reptiles have only one opening for waste expulsion. This opening is called a cloaca. Their kidneys extract waste from the bloodstream, but instead of excreting it as urea dissolved in urine as we do, they excrete it in the form of uric acid, which emerges as a white paste. This paste, as well as the waste of the intestines, emerges from the animal's cloaca.
The Study of Poop

Scatology is the study of feces. Scientists study feces to learn a variety of different things about animals, including:

**Diet:** what types of plants and/or animals make up the animal’s diet

**Health:** how healthy the animal is, what diseases the animal has

**DNA:** shows animal’s gender, how animals are alike and different

**Behavior:** shows how animals communicate with each other

Studying feces can even give scientists a glimpse into the past. The plant remains in coprolites help give scientists a picture of the environment that the animal lived in. Knowing what a prehistoric sloth ate tells scientists what type of food grew in that area at that time. This can also give scientists information about environmental changes, such as how much rainfall there was in the area that the coprolite was found in.

Sloth coprolite from Gypsum Cave, Nevada
**Coprolites**

Coprolites are human or animal feces that have been fossilized. The word coprolite is derived from the Greek words meaning “dung stone.” Feces can be preserved in three different ways. The first way preservation occurs is when feces are left in a dry place, like a cave, for thousands of years. Secondly, feces can last millions of years by becoming lithified or turning into stone. To become lithified, feces must be buried in sand, mud or silt. Over time, the minerals surrounding the feces will seep in and replace the organic matter, such as meat. The final way to preserve feces is to freeze it.

The oldest known human coprolite in North America was discovered in Oregon’s Paisley Cave. The coprolite is about 14,000 years old and contains squirrel bones, bison hair, fish scales, grass, sunflowers, and protein from birds and dogs.

The largest known dinosaur coprolite was discovered in Saskatchewan, Canada. It measures about 20 inches long and weighs over 15 pounds. The coprolite was packed with bone fragments and believed to be from a *T. rex*.

Huge patches of frozen caribou coprolites have been found in the Yukon and Alaska. Some of the patches are as long as ten soccer fields lined up end-to-end and as deep as a nine-story building.
**Dung Beetles**

Dung beetles are professional poop eaters. They roll it up, bury it, or tunnel under it and then eat it up. Most of the dung they eat comes from large, plant-eating mammals that graze on grass or eat the leaves of trees and shrubs. Herbivores have to eat larger amounts of food than carnivores, which means that herbivore dung is larger and more plentiful than carnivore poop.

So without dung beetles and other dung-eating insects, we would be overrun with poop and the flies that come with poop!

Dung beetles collect dung with their front legs, and then they shape and roll the dung with their back legs. The dung beetles even walk home backwards so they can control the ball with their back legs.

Dung beetles may store their dung balls for months at a time. And while the outside of the dung ball dries out, the inside stays nice and moist. When a dung beetle dies it is actually considered a good thing because its stored dung balls help fertilize the soil.
101 Uses for Poop

-Latrines or community toilets also act as message boards. “A quick sniff can tell an animal who did the poop, how old they were, what sex they were, and if they were head of the pack or at the bottom of the pile.” (Davies)

-Groups of animals use poop to mark their territory. It’s their way of saying, “This is our area, stay away!”

-Some insects disguise themselves as poop. Crab spiders do this to catch moths. Swallowtail Butterfly larvae do this to keep themselves from being eaten by predators.

-Scent marking: Some animals poop on the trails that they walk on to let other animals know that they have been there. Hippos use this method for navigation to find their way back to the river after a night of feasting on land.

-Secretary birds use dried Zebra poop to build their nests.

-The Maasai Tribe in Africa mix cow poop with ashes to make the walls of their huts.

-Millipedes make their nests out of their own poop and coat their eggs in poop to protect them.

-Bird droppings with berry seeds

-Termites mix poop with chewed wood to build termite mounds; making termite mounds the largest structure made of poop. They also use poop as fertilizer to help their food grow.

-Dung is used as a cement to make adobe mud brick huts.

-In the 1800s, farmers in England used dinosaur coprolites as fertilizer because there was a shortage of fresh manure.

-After animals eat fruits and berries, the seeds from those fruits and berries come out in the animals’ poop. As the animals poop they are actually depositing fertilized seeds that can grow into new plants.

-Some birds, like the turkey vulture, squirt poop on their legs to cool off.
- Cow poop is molded into self-fertilizing pots to plant seeds in.

- The Bedouins of Qatar use dried camel poop to wipe their babies’ bottoms.

**Fuel of the Future**

- In rural India ¼ of all cow poop is dried and burned for fuel. That’s fuel for about 330 million people.

- Pioneers used to burn buffalo poop to keep their houses warm.

- NASA is studying how to burn astronaut poop and other waste to power a spaceship. It is estimated that a 6 man crew would produce 2 tons of organic waste over a 2 year mission to Mars. Currently, astronaut waste is stored on board and brought back to Earth, so it is important to find a way to get rid of all that poop.

- The Dallas Zoo is planning to use animal droppings to power several of its buildings.

**How does poop fuel work?**

Poop fuel or biogas is mainly methane and carbon dioxide gasses given off by decomposing organic material like poop. This gas is used in fuel cells and biogas generators. Biogas generators are used for heating, water, and electrical power.
The Most Extreme

**Largest Pooper:** Blue Whale, 10 inches wide and several yards long.

**Smallest Pooper:** Bumblebee Bat, droppings are the size of a pinhead.

**Smelliest:** Orangutans, after eating Durian fruit.

**Messiest:** Hippo, sprays poop in all directions with its tail.

**Totally Gross:** Civet cats, eat coffee cherries, poop out coffee beans, and you guessed it, those coffee beans are brewed into a very expensive cup of coffee at about $50 a cup.

**Most frequent:** Rabbits produce up to 500 pellets a day. Imagine if you had to go that often. That is about one poop every three minutes of the day for the rest of your life.