
ADDENDUM

41 – Animals on the Moon

SUMMARY

This chapter describes the different categories of animals that we can expect to show upon the Moon. It starts with a female dog that will have the first, off-Earth puppy (what joy!). There will also be a set of experimental animals that will be used to determine the AGRx for healthy gestation and childhood. Finally, as international astronauts start arriving, they can bring animals unique to their country to add to a growing zoo.

Animals will play several different roles when it comes to space development and settlement. The following write-up describes what we can now imagine.

PET ANIMALS

In the chapter regarding the Initial Permanent Crew, it is described that one of the crew (and probably the most popular crew member) could be a female dog. It could have its own space suit with helmet and little oxygen tank. Let loose, it would be able to run freely on the surface of the Moon and could even be trained to conduct back flips in the Moon's 1/6th gravity.

Rover? FIDO?

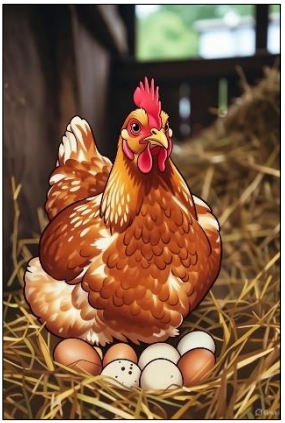
And it wouldn't be long before that dog's mate would be brought up on a following cargo mission. And we all can imagine what a dog and its mate leads to -- puppies! These initial dogs would generate a tremendous amount of attention and excitement by the many dog lovers on Earth.

During the private settler phases, some may be so attached to their pets that it would be necessary for them to be able to bring their pets else they will refuse to move to the Moon. We now live in the era where service pets are allowed to go where only people had previously been allowed to go. This has increased the acceptance of pets living within human society.

FOOD ANIMALS

The consensus of our Agriculture Working Group (AgWG) is that initial food grown would be strictly from plants and not from animals due to the crew time that would be consumed maintaining the system for the animals. But as the population of the base gets into the hundreds, certain animals could start to be grown for food. Given that practically all societies on Earth eat animals, it seems most likely that this practice will continue as people from around the world start moving beyond Earth.

Very early on, just a few types of animals that would provide food for the crew. Initially, fish in a fish tanks fed by algae would be the easiest form of meat possible. Chickens and rabbits will also be early animals for food. The AgWG excluded insects as food because of the "ick factor". It is rather important that we not scare the public from wanting to become settlers. It is inevitable that the media will highlight any idea that you will have to eat insects if you want to be part of the first off-Earth settlements.



Chickens for early protein food.

Waste from the hydroponic greenhouse could be fed to herbivorous fish which could then be eaten by the crew. Likewise, chickens could be an early farm animal -- not so much for their meat but for their eggs. Larger livestock such as cows would come much later after habitats large enough and systems sophisticated enough could deal with them.

Feed

A major consideration for animals would be just how much more food would need to be produced, especially for carnivores such as cats. Certainly, the fish could serve as a source of food for the animals. The good news is that the animals could be smaller than people (e.g. a small dog breed) and so only a portion of caloric intake compared to each

human. But, as the number of animals increases there would need to be dedicated FeedHabs and the systems to power them.

MORE ANIMALS

Some additional animals could be periodically brought to the Initial Base to help keep the public's attention on the going ons. Consider how much interest there would be when a finger monkey first arrives wearing his own little jumpsuit with a NASA logo on it! But early on, the number of animals brought in might be limited due to the amount of time it would take for the Initial Crew to care for them except that teleroperated or autonomous robots could offload much of that work.

The finger monkey

International Animals

During the International Lunar Exploration Phase (ILEP), as international explorers arrive, some of them could contribute unique animals from their countries to a growing lunar zoo. The arrival of such animals could well interest the public not only from the country's citizens but from animal lovers worldwide. Some of the animals could be a surprise in that very few would know which animal was going to arrive until it actually did.

BarnHab

Eventually it could be possible to have meat animals such as beef and pigs in habitats specifically designed for them -- a "BarnHab". A pretty good case could be made that modern approaches would make the growing of meat unnecessary because it is inefficient compared to alternatives. The Impossible Burger and Beyond Meat are examples of meat alternatives which are becoming increasingly popular.

ANIMALS FOR REPRODUCTION STUDIES

Chapter 24 describes the use of artificial gravity to determine the artificial gravity prescription (AGRx) for healthy gestation, childhood, and adulthood. For the first two, there would need to be a series of animal

studies to generate some data that would inform would-be parents about what effects the reduced gravity would have on their child and how much artificial gravity might be necessary for a good outcome.

As described in the chapter, the set of animals may be: mice, hamsters, marmosets, and finally macaque monkeys. The Biologist would be the main crew member caring for and handling these animals. If the AGRx studies indicate that it would require an unreasonable amount of artificial gravity to have good health outcome then, disappointedly, the settlement couldn't have children. It wouldn't necessarily mean the end of the settlement as there are many (retirement) communities on Earth that don't have children. But in those settings, it may be that pets may provide some of the activity and dependency that children would normally provide.

PRESERVING AND REPRODUCING EARTH'S BIOSPHERE

An Animal Preserve

The BioPreserve is a concept for the backing up of Earth's biosphere in the form of species frozen in their most reproducible forms (e.g. spores, seeds, embryos, etc.). This seems fine until we get to the mammals. Mammals need mothers to carry them during pregnancy. There are only 5,416 different mammal species. A lunar mammalian zoo is discussed here including how the emerging level of reproductive technology (e.g. artificial wombs in centrifuges) could prevent the need to maintain a mammalian zoo and all of the effort it would take.

Paraterraformed Fauna

The very long-term, goal for space advocates would be to fully reproduce Earth's biosphere off Earth. This could be done more quickly using the paraterraforming approach (i.e. large greenhouses) as compared to the full terraforming approach (i.e. open-air approach). In the paraterraforming approach, one would need to figure out how the ecology of different species would work to create stable relationships between them. This is no easy task as the Biosphere 2 project demonstrated. But it is eventually doable.fa