

# Animal Environmental Science

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# Welcome

This is the website for “**Animal environmental science**”. To understanding individual animals, we have to understand the relationship they have with their environment. This book will introduce the interaction between animals and the environment.

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(Snow Monkey Niseko, Kutchan-chō, Japan)



# Chapter 1

## Introduction



All living creatures constantly interact with the environment. To understanding individual animals, we have to understand the relationship they have with their environment. Basically, animals can find food, shelter, protection, and mates from the environment called **habitat**. The animal habitat includes both phisical (non-living) and biotic (living) components (see Table 1.1).

Animal habitat is constantly changed over time. Not only natural disasters (Eruption of volcano, earthquake, tsunami, and wildfire), also human activity can affect the animal habitat. Unlike the wildlife, the environment of domesticated animals (such as cow, pig, poultry, and dog) that raised in facility are controlled by the human. Because it's a very huge field, this book can't cover every topic of both wildlife and domesticated animal. Thus, from now on, we will deal with the topic for the domesticated animal.

Table 1.1: Components of habitat (physical and biotic)

| Physical        | Biotic                          |
|-----------------|---------------------------------|
| Temperature     | Plant matter                    |
| Humidity        | Predators                       |
| Oxygen          | Parasites                       |
| Wind            | Competitors                     |
| Soil            | Individuals of the same species |
| Light intensity |                                 |
| Elevation       |                                 |





## Chapter 2

# Animal and environment

### 2.1 External environment

Animal never separates from the stimuli from outside. In the domestic animals, the external environment includes both physical (e.g. housing, feeder, paddock, fence, and noise) and biotic (e.g. human, mate, and feed ingredients) components like those of animal habitat 1.

### 2.2 Internal environment

“The living body, though it has need of the surrounding environment, is nevertheless relatively independent of it.” — Claude Bernard

Higher animals have complex organ systems that respond to stimuli to perform their essential body functions. When the animal receives the signals from the sensory organs, they produce a local reflex action and/or react in the central nervous system. Weak signals produce no responses, but strong stimuli changes the physiological or behavioral status of the animal.

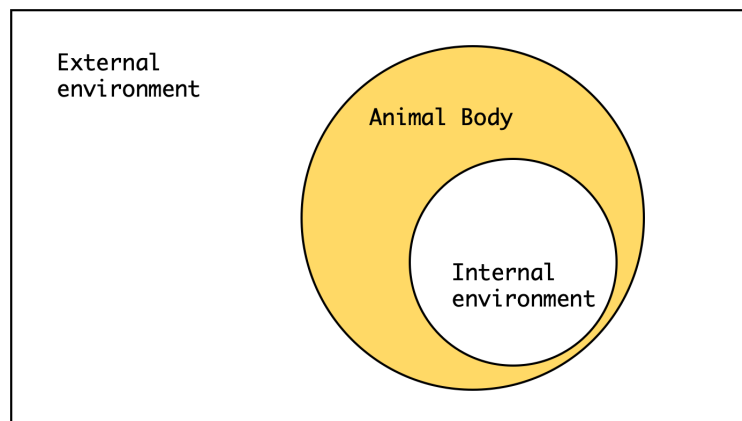


Figure 2.1:



- Life stage of the organism changes.

### **2.2.2 Adaptation**

Hafez (1968) define the adaptation as below.

“Changes in morphological, anatomical, physiological, biochemical and behavioral characteristics of the animal which promote welfare and favor survival in a specific environment.” — Hafez



## Chapter 3

# Thermoregulation

Here is a review of existing methods.



## Chapter 4

# Light

Here is a review of existing methods.





## Chapter 5

# Sound

Here is a review of existing methods.



## Chapter 6

# Air Quality

Here is a review of existing methods.



## Chapter 7

# Water Quality

Here is a review of existing methods.



## Chapter 8

# Cycles of Materials

Here is a review of existing methods.





## Chapter 9

# Manure

Here is a review of existing methods.



## Chapter 10

# Animal welfare

Here is a review of existing methods.



## Chapter 11

# Sustainable livestock industry

“In essence, the conflict between livestock and the environment is a conflict between different human needs and expectations.” — Henning Steinfeld (FAO)