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Preliminary Study on Feed Formula of Early Weaned Ursus Thibetanus

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Abstract: To explore the feed formula of artificial feeding Ursus thibetanus, and to provide a reference for the feed formula of post-weaning Asian black bear cubs. A suitable feed formula for early weaning black bear cubs was selected from 25 newly weaned black bear cubs. The results showed that 25% formula dog milk, 65% formula rice flour and 10% corn flour were the most suitable feed formulas for early weaning black bear cubs.

Keywords: Ursus Thibetanus; Artificial Feeding; Feed Formula.

1. Introduction

Ursus thibetanus ***(Selenarctosthibetanus)*** are carnivorous, ursiidae, also known as bears, black blind, national second-class protected animals, most of the domestic zoos have exhibits. The most prone disease of Ursus thibetanus is digestive tract disease [1], and digestive tract disease is mainly caused by improper nutrition supply. Too little supply affects growth and development; Excessive supply of excessive burden on the digestive tract, easy to lead to diarrhea, diarrhea, abdominal distension and other intractable diseases, causing digestive tract damage, triggering a chain reaction, falling into a vicious cycle, so that the body cannot get the required nutrients, resulting in growth and development of Ursus thibetanus. Under the conditions of artificial feeding, there are two main problems in the feeding and feeding of young Ursus thibetanus. One is the nutrition supply during the young period of artificial or artificial assisted rearing; The second is the nutrition control of black bear cubs in the transition period from feeding on milk to artificial milk. The main challenges for hand-fed animals include ensuring that the cubs receive adequate nutrition, preventing disease and infection, and promoting their socialization and behavioral development. Indigestion and non-excretion, for example, are common problems during captive feeding and need to be addressed through dietary adjustments and improved hygiene management [2].

2. Materials and Methods

2.1. Test Animals

The subjects of this experiment were 25 weaned black bear cubs, aged between 2 and 3 months (within 15 days of age difference).

2.2. Feeding and Management

Table 1. Feed formula

Date	April 17 - April 29	April 30 - May 15	May 15 - June 30
Feed name	Dosage of first formula (%)	Second formula ratio (%)	Third formula (%)
Yili milk powder	40	23.8	
Dog Milk powder %			25
Heinz Nutrition Formula rice flour %	30		65
Cornmeal %			10
Rice %	30	53.6	
Piglet puffed feed %		10	
Eggs %		7.9	
Honey %		5	

In the process of artificial feeding, the ambient temperature should be controlled within the range of 25°c - 30°c. The feed is mainly artificial milk, and the feed raw materials of artificial milk are divided into milk powder, rice powder, corn powder, etc. The milk powder is mainly Yili milk powder and imported dog milk powder, and the rice powder is mainly ricing powder and Heinz formula rice powder. Since this experiment was the first time to explore the feed of black bear cubs, the feed formula was changed according to the physiological response (excretion) status of the animals. Through continuous exploration, the feed formula was mainly divided into the following three parts, as shown in Table 1.

2.3. Looking at Indicators

2.3.1. Observe and Record the Excretion of Ursus Thibetanus Every Day

Observe and record the feces of Ursus thibetanus every day, including the abnormality and incidence.

2.3.2. Weighing

Weigh young Ursus thibetanus regularly, calculate the

average daily body gain at all ages, and weigh the cubs when they are taken out on the first day after weaning. After that, fasting weight was weighed every 10 days at a fixed time.

2.4. Data and Statistics

All experimental data were processed using ExCel.

3. Experimental Results and Analysis

3.1. Effects of Different Feed Formulations on Digestion of Black Bear Cubs

Table 2. Effects of different feed formulas on digestion of black bear cubs

The First Formula		Second recipe		Third recipe		Third recipe		Third recipe		Third recipe	
Weaning time	Abnormal stool (only)	Weaning time	Abnormal stool (only)	Weaning time	Abnormal stool (only)	Weaning time	Abnormal stool (only)	Weaning time	Abnormal stool (only)	Weaning time	Abnormal stool (only)
1	5	15	11	29	22	43	6	57	7	71	4
2	2	16	7	30	16	44	6	58	8	72	3
3	1	17	12	31	13	45	7	59	7	73	2
4	1	18	11	32	13	46	4	60	6	74	1
5	1	19	13	33	13	47	5	61	5	75	1
6	5	20	16	34	16	48	4	62	6		
7	3	21	15	35	11	49	5	63	5		
8	8	22	13	36	13	50	7	64	3		
9	5	23	16	37	12	51	7	65	3		
10	3	24	19	38	15	52	9	66	3		
11	2	25	16	39	12	53	10	67	3		
12	10	26	19	40	11	54	8	68	3		
13	9	27	19	41	10	55	6	69	5		
14	15	28	22	42	8	56	6	70	4		

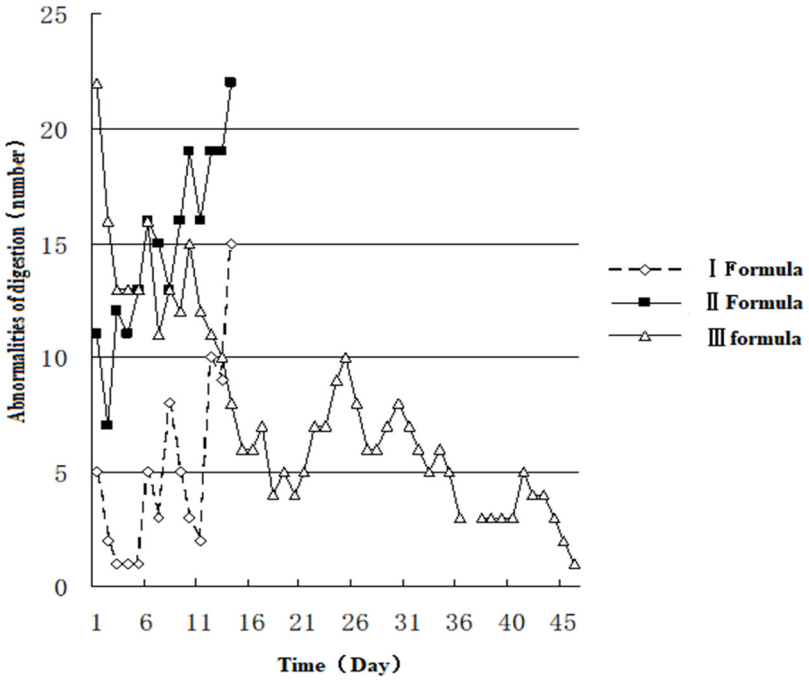


Figure 1. Effects of different feed formulations on digestion of black bear cubs

From the three formulas in Table 2 and Figure 1, the third formula is the most suitable feed formula for weaning black bear cubs. Black bear cubs were fed the first feed formula, and the fecal abnormalities gradually increased. In the last three days, 9, 10 and 15 black bear cubs showed abnormalities respectively, and the abnormal rate was 60% on the last day. Black bear cubs were fed the second feed formula 14 days after weaning, and the effect was obvious at the beginning, but the abnormal number of fecal abnormalities in the later cubs was almost in a gradual state. On the last day of feeding the second formula, the number of abnormal fecal abnormalities reached 22 black bear cubs, accounting for 88% of the abnormal. In the third feed formula, the abnormal number of faeces of the cubs was in a decreasing state, and on the 47th day, almost all the faeces of the cubs were normal. In the course of the abnormal stool, the stomach and anti-diarrhea drugs have been adjusted, but the effect is not very obvious.

3.2. Weight Changes of Black Bear Cubs

As can be seen from Table 3, the daily body weight of black bear cubs gradually increased when they were fed the first feed formula, but the increase was not very large. When they were fed the second formula, their weight increased first and then gradually decreased. Combined with Figure 1, it can be seen that during this period, the abnormal feces of the cubs led to their weight loss. When fed the third feed formula, their body weight increased day by day and was in a progressive

state. Within 10 days, 3 black bear cubs gained about 2.5kg in weight. From the point of view of weight, the third formula feed is better for the digestion and absorption of black bear cubs.

Table 3. Weight changes of weaned cubs with different feed formulations

Weaning time (days)	1	10	20	30	40	50	60	70
Weight (g)	3045±583	4,024 ±624	4721±398	4216±479	4,814 ±673	5,912 ±765	7,498±869	9501±959

3.3. Study on the Appropriate Energy and Protein Supply of Different Feed Formulations to Early Weaned Black Bear Cubs

Table 4. Egg energy ratio of black bear cubs after weaning with different feed formulations

Name	First feed formula	Second feed formula	Third feed formula
Protein averages	9.31	9.98	11.27
Energy average	1733.4	1691.5	1649.6
Egg energy ratio	0.0053	0.0059	0.0068

Too high or too low a nutrient supply can lead to animal damage. Too high nutrition supply is easy to cause excessive burden of animal digestive tract, diarrhea; Too low nutrient supply will reduce growth performance and hinder growth and development. Black bear cubs' digestive tracts are extremely fragile, and damage to them can have lifelong consequences. Therefore, providing the right level of nutrients is especially important for weaning black bear cubs. The appropriate ratio of energy and protein in the feed should be maintained. Improper ratio can affect nutrient utilization and lead to nutritional disorders. High protein and low energy promote the growth and development of animals at the beginning of weaning. Therefore, the third feed formula may be a more suitable egg-to-energy ratio for black bear cubs.

4. Results

1. The weight of black bear cubs is an important index to measure their health level, and the feed formula will directly affect the growth and development of the young stage.

2. 25% formula dog milk, 65% formula rice flour and 10% corn flour are the most suitable feed formulas for early weaned black bear cubs.

3. The egg energy ratio in the feed formula has an effect on the growth and development of early weaned black bear cubs.

5. Discussion

5.1. The Establishment of Nutrient Requirements is a Very Complex and Lengthy Process

Extensive animal testing is required to complete this process. These animal tests need to set the corresponding test conditions, with the help of special equipment, slaughtering a large number of individual animals, and then to calculate the amount of nutrients required by animals. Due to the particularity of Ursus thibetanus, it is impossible to study the appropriate nutrient supply of giant pandas in accordance with the determination of the needs of these animals. In contrast, the research method of human nutrition requirement may be more suitable for the rare wild animals of black bear. In human nutrition studies, the requirement of each nutrient is defined as the minimum intake necessary for normal function and health. In order to make up for differences in nutrient requirements between individuals, as well as differences in nutrient bioutilization efficiency between common foods, a certain amount (sometimes called a safety factor) is usually added to the amount required. Ursus thibetanus are bred to produce more healthy offspring, and the basis and premise of reproduction is the physical health of the animal. Therefore, we can consider the amount of nutrition obtained by healthy Ursus thibetanus as the reference value of suitable nutrition supply for Ursus thibetanus after weaning. This reference value is applied in practice to verify and revise it.

5.2. Due to the Limitation of Test Animals, Three Feed Formulas Cannot be Tested at The Same Time, and the Feed Formula Can Only Be Continuously Improved and Changed in The Feeding Process

In order to achieve the successful effect of young breeding. Therefore, these three feed formulations were not tested at the same time, although the third group of feed formulations was more suitable for the growth of black bear cubs in terms of litter abnormalities, weight changes, and egg energy ratio. However, feed formula 3 is fed on the twenty-nine days after the young are weaned, when the various functions of the young bear body are more perfect than when they are just weaned, so whether feed formula 3 is suitable for young bears who have just been weaned needs to be verified and modified in the future test.

5.3. The Protein and Energy Content in The Feed Formula are the Feed Formula Provided by The Feed Company

Due to the conditions, we did not personally test their content through the experiment. Therefore, it may have a certain impact on the results, and can only be verified and modified in the later test.

1. It can be seen from the study on the appropriate energy and protein supply of early weaned black bear cubs that the egg energy is better than the one that should be slightly lower, which is exactly the opposite of the study on the appropriate energy and protein supply of early weaned young giant pandas.

2. Many researchers and practitioners believe that completely imitating the breeding methods of wild animals -- allowing cubs to live with female giant pandas until they are 1 year old and then weaning them separately is the most ideal feeding method. However, this possibility is too small under artificial breeding conditions, because there is a higher probability of twins being born under artificial breeding conditions, and there are more cases in which the mother does not bring up, does not lactate or produces insufficient milk after delivery. Under artificial feeding conditions, we have to

face more problems of early weaning of young Ursus thibetanus. There are many reports on weaning in pigs. Wang Jinghua, Wang Yizhen et [3] al believe that the gut is not only the largest digestive and absorption organ in the animal body, but also the largest immune organ in the body. Early weaning caused by weaning piglets appetite loss, indigestion, slow weight gain, diarrhea and other manifestations of early weaning syndrome; It is also reported that early weaning can cause temporary nutritional deficiency of piglets, and the weaning diet change is easy to cause gastrointestinal damage. Ursus thibetanus may have the same gastrointestinal immune mechanism as pigs. Black bear's breast milk is more special, which is extremely important for the growth and development of young Ursus thibetanus. The special protective factors contained in breast milk may effectively alleviate the immune response caused by xenoproteins in the intestines of young Ursus thibetanus. When completely fed artificial combined milk after weaning, young Ursus thibetanus lose the protection of special protective factors in breast milk, and the intestinal immune mechanism is easily stimulated. Therefore, in addition to ensuring reasonable nutrition supply during the weaning period of juvenile Ursus thibetanus, more attention should be paid to the feeding and management measures in place, high-quality feed raw materials should be selected, and measures should be taken to supplement the black bear cubs in advance so that they can adapt to new foods, so as to ensure the normal growth of young Ursus thibetanus during the weaning period.

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