

Short Communication

Determination of hair loss (alopecia) cause and effective treatment in laboratory rabbits

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ABSTRACT

In number (16 of 22) of infants in the Dutch laboratory rabbit breeding colony, in aged 45-65 days old, hair loss (alopecia) seen at the top of the head and around a week after the hair fall, was created in a state of complete alopecia. For determination of the cause of hair loss, after the observation and palpation the alopecic area, there have not been any swelling, abscesses, tumors. In skin scrapings, has not revealed the presence of any ectoparasite. Also in scratched skin samples, after lacto phenol cotton blue and specific PAS staining, there was no evidence of fungal disease. The result of bacterial and fungal culture in specific media was negative. On histopathological examination, no specific pathologic lesion was observed. For fungal dermatitis, there were no specific signs in histological sections. In autopsies of animal, certain pathological lesions were not observed in various organs and tissues. After being excluded infectious agents, full analysis of rabbit food pellet done and was determined, the amount of food energy, the percentage of food protein and crude fiber that showed a significant reduction for growing rabbits. The zinc value and the other dietary factors, were in the normal range. Since lack of dietary factors, especially protein and crude fiber cause hair loss in rabbits, accurate balancing the diet and the addition of protein, energy and dietary fiber, the diet with a new formula prepared. The affected rabbits were divided in two separated cages as two groups of seven animals each. The new diet was given in the first group of alopecic rabbits and the other group as before, the previous diet was given. After 20 days in group 1 re-growing hair in the alopecic area began and the hair covering was full after 10 days. but group 2, still remained alopecic. With effective treatment in group 1, the same operation for group 2 had done which they were treated completely 20-30 days later too. By the results of this research, for the prevention of various disorders, including alopecia, the new formula as a food supplier for the growth stage was introduced to the laboratory rabbit breeding colony.

Keywords: Alopecia, Laboratory Rabbit, Treatment

INTRODUCTION

The skin of rabbits is a window to their general state of health. Alopecia is the complete or partial lack of

hair in areas where hair is normally present. (Jones & Hunt 1983, Kraus *et al* 1984, Fox *et al* 2002) In rabbits, this common disorder may often be the symptom of another cause, such as infection, trauma or immune disorder and nutritional deficiency. (Flatt *et al* 1974, Cheeke 1994, Bergdall & Dysko 1994, Cheeke 1997)

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For rabbits, there is no specific age, breed or sex that is more susceptible to this disorder. The primary sign of alopecia is unusual hair loss. However, other symptoms such as fatigue, weight loss or gain and changes in appetite are important to note. Symptoms may progress suddenly or slowly. Different patterns of alopecia, such as hair loss only from a certain part of the body are pathognomic diagnosing the cause of alopecia. (Kraus *et al* 1984, Cheeke 1994, Fox *et al* 2002)

In some cases, alopecia may be the result of a behavioral problem known as “barbering”. This is where a dominant rabbit will chew or pull the hair out of its fellow cage-mate, hair loss predominantly appears on the flanks. (Podberscek *et al* 1991, UFAW handbook 1999, UFAW handbook 2010) Alopecia can occur because of normal shedding patterns, especially in breeds such as the Dwarf, miniature Lop and Angora. Fur-plucking in the neck or dewlap, belly and leg areas occurs in pregnant females who are close to delivery to line their nest. (Podberscek *et al* 1991) Two types of hair loss occur in rabbits. The pattern or amount of hair loss may identify whether it is a primary or normal hair loss or a secondary hair loss caused by preventable factors. Primary causes of hair loss include normal shedding and nest building. The secondary causes are diseases or parasitic infections, nutritional deficiencies, dental problems, over-grooming or from one rabbit pulling out another’s fur in an act of dominance or aggression. (Myktowycz 1957, Cloyd & Moorhead 1976, Cohen 1980, Podberscek *et al* 1991, Hofing & Kraus 1994)

For prevention, keeping cages clean and making sure each rabbit receives well-balanced meals with plenty of protein will help to prevent hair loss, as will housing adult rabbits in separate cages to avoid aggression. (Podberscek *et al* 1991, Cheeke 1994)

MATERIALS AND METHODS

In number (16 of 22) of infants in the Dutch laboratory rabbit breeding colony, in aged 45-65 days old, hair loss seen in the top of the head and around a week after the hair fall, was created in a state of

complete alopecia. (Figure 1) Since many factors including infectious agents cause this disorder, Immediately these 16 infants isolated to colony to prevent the possible spread of the possible infection and so to diagnose the cause of alopecia. These rabbits were quarantined in the other room and in two separated cages (7 infants in each cage as a group).



Figure 1. An old infant rabbit with complete sign of alopecia in the top of the head.



Figure 2. Hair full covering 30 days after consuming the balanced diet.

Diagnosis operation. After careful consideration, in order to assess any swelling, abscesses and tumors, the appearance observation and palpation the affected area done. Scratching the skin in a hairless area for preparation of samples in order to observe the external

parasites and so of bacterial and fungal cultures and for PAS (Periodic Acid-Schiff) and lactophenol cotton blue staining for direct and rapid observation the fungal filaments were done. Also after euthanasia by CO₂, the affected areas were cut and prepared for pathological study. The specimens were kept in 10% formalin until the examination time. The autopsy was conducted to evaluate the various organs and tissues. For primary bacterial culture, the TSB (Trypticase Soy Agar) was used in 37 °C. Also the selective media including Blood Agar, TSA (Trypticase Soy Agar) and MacConkey and various biochemical tests for accurate identification of pathogenic bacteria were prepared. For cultivation of Fungi the SDA (Saboraud Dextrose Agar) medium in 37 °C was used. The food pellet used to feed the rabbits was sent to the nutrition laboratory for the complete food analysis, because the dietary conditions of supply of materials for different age stages especially in the growth stage should be determined. The general state of health and lesions areas in rabbits was observed and controlled daily. Also the breeding colony was controlled of new cases of disease.

RESULTS AND DISCUSSION

In survey and apparently observation and palpation the alopecic area, there have not been any swellings, abscesses and tumors. In skin scrapings taken from alopecic region on the top of the head have not revealed the presence of any ectoparasite (Mites, Fleas) under microscopic examination. In scratched skin samples, after lacto phenol and specific PAS staining, there was no evidence of fungal disease. The fungus culture in SDA, after a week of incubation was negative. In bacterial cultures, after primary culture in TSB medium and culture of grown colonies on special media did not grow any pathogenic bacteria, therefore no biochemical test for differentiating the diagnosis and identification of pathogenic bacteria, was used. On histopathological examination of prepared sections of the affected area, no specific pathologic lesion was observed. Also there were no signs of neoplasia and skin cancer. For fungal

dermatitis, there were no specific signs in histological sections such as hyper keratosis, folliculitis, acanthosis and the diffused infiltration of leukocytes into the dermis layer. In autopsies of animal, certain pathological lesions was not observed in various organs and tissues. In result of the full analysis of food pellet, the amount of food energy was 2090 Kcal/kg, the percentage of food protein was 15.3 and the crude fiber of the food was 11% that showed in all three amounts a significant decrease for growing rabbits. This amounts are sufficient for the maintenance condition however for growing animals, the reduction of them especially decreases of food protein that cause reducing in essential amino acids need for growth to be followed will lead to hair loss. (Cheeke 1997, Cheeke 1994, Fekete and Bokori 1985, NRC 1996) Therefore the balance of diet and the addition of protein, energy and dietary fiber, and a new formula with 19% protein, 2500 Kcal/kg energy and 20% fiber, was prepared and confirmed by full analysis. It is the other required materials such as fats, vitamins, minerals (including zinc) were in the normal range for the growth stage and there was no need to increase their rations. Zinc levels analysis were 50 ppm and much less than 2 shown to cause hair loss in rabbits. (Cheeke 1994) On the next stage, after being excluded in parasitic, bacterial and fungal infections, with the determine nutritional deficiencies, diet with a new formula was given in the first group (7 alopecic rabbits) and the other group (group 2) as before, the previous diet was given. After 20 days in group 1 re-growing hair in the alopecic area began and the hair covering was full after 10 days, (Figure 2) but group 2, still remained alopecic. With effective treatment in group 1, the same operation for group 2 had which they were treated completely 20-30 days later. It is necessary to increase protein, energy and dietary fiber, with the exact calculation and adding values soybean meal, wheat, corn and wheat bran, as well as new foods were prepared (Cheeke 1997, Fekete & Bokori 1985, NRC 1996). The new formula as a food supplier for all stages of growth and lactation stages introduced to the breeding colony of rabbits to

prevent different disorders, including alopecia. Alopecia is associated with some sort of disruption of hair follicle growth. This may result from a number of causes, including parasitic infection (such as fleas or mites in ears, fur or skin), infectious disease (such as bacterial infection), and nutritional defect. (Cohen 1980, Cheeke 1994, DeLong & Manning 1994) The neoplastic cause (the presence of unnatural clusters of cell growth, such as a tumor) also if there are multiple areas of hair loss (Multifocal), it is most frequently associated with a parasitic or bacterial infection. (Greene 1965, Li & Schlafer 1992) *Cheyletiella parasitovorax* and *Leporacarus gibbus* are fur mites can cause a hypersensitivity reaction. *Psoroptes cuniculi* is the most common rabbit ear mite and has been observed to infest other regions of the body. Burrowing mite such as *Sarcoptes scabiei* can cause alopecia spots in the hind and front limbs. Fleas can cause hair loss, redness, small crusts and itching in rabbit. (Myktowycz 1957, Cloyd & Moorhead 1976, Cohen 1980, Lee 1991, Hofing & Kraus 1994) Infection by the bacterium *Pseudomonas aeruginosa*, sometimes causes a moist dermatitis which shows as a bluish discoloration of the fur. *Treponema cuniculi* is a bacteria called a spirochete. It causes crusty dermatitis primarily around the rabbit's genital or nose but in severe cases can extend upwards on the face and around the eye. (Greene 1965, Kraus et al 1984, DeLong & Manning 1994, Fox et al 2002) Ringworm is not a worm but a fungus that takes its name from the classic raised red circular lesion with a clearing center that can be a primary symptom. Ringworm most commonly occurs on the rabbit's head, ears and face. (Hagen 1969, Flatt et al 1974, Bergdall & Dysko 1994) The most common cause of lumps and bumps on rabbits are warts, caused by papilloma virus and benign growth such as fatty tumors (Lipomas). Malignant skin cancers are not common in the rabbit, but do occur and are most often a metastasis of another cancer. Any unusual growth on the skin should be watched for changes in size, shape or color. Local reactions to injections such as vaccines can result in hair loss

(Greene & Strauss 1949, Li & Schlafer 1992). In nutritional defect especially protein deficiencies and inadequate fiber intake have been reported to result in hair loss. Also the rabbits given the zinc deficient diet exhibited alopecia, skin lesions and frequent *Pasteurella* infections. (The optimum value of zinc in diet is 50 ppm and diet containing 2 ppm of zinc is deficiency diet and produce the sign of zinc deficient including hair loss, skin inflammations, graying of the hair, reduce appetite, weight loss and poor reproductive performance). The importance of protein quality in rabbit nutrition is well recognized. For rapid growth, rabbits are dependent upon adequate quantities of dietary essential amino acids. Very young rabbit (3-6 weeks of age) has a requirement somewhat higher than the other stages. The best value for this factor is 17-19 percent. Fiber is an important component of a ration for a rabbit and it is recommended that 12-22.5% of a food should be crude fiber. (Kraus et al 1984, Fekete and Bokori 1985, Cheeke 1994, NRC 1996, Cheeke 1997) For diagnosis, if alopecia is apparent, there are a number of diagnostic procedures that may be done to determine the cause. A skin scraping and biopsy may be done to rule out any bacterial, parasitic or fungal infections. (Flatt et al 1974, Bergdall and Dysko 1994, Hofing and Kraus 1994, Fox et al 2002) Additional tests that can be conducted include a dietary survey in order to balance the situation, for nutritional deficiencies by complete food analysis (Fekete & Bokori 1985, NRC 1996, Cheeke 1997). Treatment and the medications prescribed depend specifically on the underlying cause of alopecia. Medications to treat parasites such as ear mites, as well as medications to treat bacterial infections, are available. Of course, if the cause is more serious, such as related to a tumor, more drastic measures, like chemotherapy, may be necessary (Bergdall & Dysko 1994, DeLong & Manning 1994, Fox et al 2002). For living and management, follow-up care after initial treatment depends on the cause, if the alopecia is suspected to be the result of "barbering", the rabbits must be separated to avoid future incidents (Podberscek 1991, NRC 1996). For prevention, as there

are numerous causes leading to alopecia, no specific prevention method can be recommended. However, a healthy life style, well-balanced diet with sufficient protein and general cleanliness of the rabbit's habitat may be helpful in avoiding needless hair loss (Fekete & Bokori 1985, Cheeke 1994). In these cases after accurate inspection of the alopecic rabbits there have not been any swellings, abscesses and tumors. The result of skin scrapings has not revealed the presence of any ectoparasite (Mites, Fleas) under microscopic examination. After lacto phenol and specific PAS staining, there was no evidence of fungal disease. The result of bacterial and fungus culture specific media were negative. Also all of the histopathological examination for neoplasia, skin cancer and fungal dermatitis were negative. In result of the full analysis of food pellet, the amount of food energy, the percentage of food protein and the crude fiber of food were inadequate for growing rabbits. So to balance the diet and the addition of protein, energy and dietary fiber, and a new formula was prepared and was given to alopecic rabbits. The other group as before, the previous diet was given. After 20 days in a first group re-growing hair in the alopecic area began and the hair covering was full after 10 days but the other, still remained alopecic. With effective treatment in group 1, the same operation for group 2 had which they were treated completely 20-30 days later. It is necessary to increase protein, energy and dietary fiber, with the exact calculation and adding value soybean meal, wheat, corn and wheat bran, as well as new foods were prepared. The new formula as a food supplier for all stages of growth and lactation stages introduced to the breeding colony of rabbits to prevent different disorders, including alopecia.

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