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Behaviour in order to evaluate the palatability of pet food in domestic cats

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ABSTRACT

Palatability of pet food has been mainly assessed by intake ratios. In the present study we have searched for behavioural clues of food palatability in domestic cats *Felis catus*. Two diets differing in palatability (Very Palatable Kibbles and Low Palatable Kibbles) were evaluated by a panel of 17 cats using an automated feeding station and video recordings. The cats tested each diet in two different sessions, with only one diet during a given session. A session lasted for two consecutive days with food continuously available during 20 h per 24 h period. At each of their visit to the feeding station, the quantity of food eaten by a cat, the speed of consumption and the latency to eat were recorded. The behaviour of the cat was also analysed for each visit. All the cats made at least four visits to the feeding station during a 24 h period. We compared the different quantitative variables between the two diets for the first three visits and for the last visit of each of the two days of a session. Our results showed that, as expected, cats ate more VPK than LPK. Addressing behavioural patterns, the length of sniffing was significantly reduced with VPK on the two first visits of the first day, suggesting less hesitation in this situation. Neither the latency nor the speed of consumption was affected by the palatability of the kibbles.

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1. Introduction

Food is a basic biological commodity and taste is a powerful stimulus which can elicit either positive or negative reaction. Studies have shown that specific behaviours (i.e. facial and body reaction) can be expressed in relation to the taste of the food. In rats (Grill and Norgren, 1978) and in primates (Steiner et al., 2001) a sucrose solution elicited tongue protrusion and mouth movements whereas quinine solution elicited gapes, chin rubs, headshakes and forelimb flailing. In humans, sweet foods elicited positive or hedonic patterns of lip smacking and tongue protrusion, accompanied by relaxation of muscles of the middle face, and an occasional smile. On the other hand bitter quinine elicited negative or aversive gapes, and complex grimaces involving retraction of the lips, frowning of the brows and muscles around the eyes, and wrinkling of the nose (Schaal et al., 2000; Steiner et al., 2001).

The domestic cat is, with the dog, the most representative pet in households (Murray et al., 2010). Their feeding

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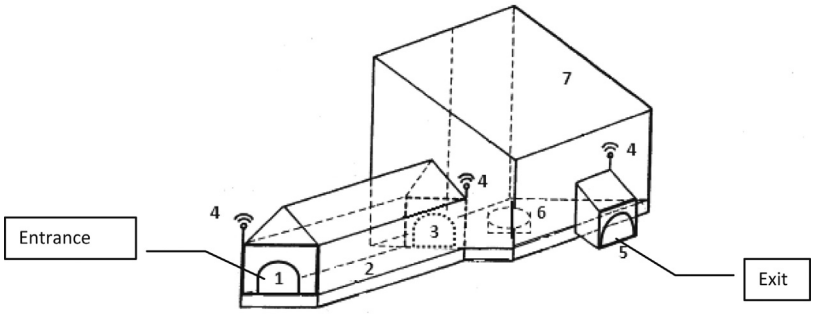

Fig. 1. Automated feeding system (patent Larose 2007). Description of feeding system used:1—first flap; 2—corridor; 3—second flap; 4—RFID system; 5—third and last flap; 6—bowls; 7—feeding area.

behaviour is unique in regard to circadian rhythm, cats being intermittent feeders. They have several short feeding periods, referred thereafter as meals, throughout the 24-h period and there is no direct relationship between the size of a meal and its timing (Mugford, 1977; Thorne, 1982). Cats may have 11 to 16 meals per day with 5 to 7 g eaten per meal (Kane et al., 1981, 1987). Cats are strictly carnivore with specific needs in nutrients; they are selective in food and prefer to consume freshly killed carcasses like mice, rats, rabbits, birds, lizards, insects and other animals rather than carrion (Bontempo, 2005; Bradshaw et al., 1996; Bradshaw, 2006; Watson, 2011). It is, therefore, a challenge for industrials to find the equilibrium between palatability and the nutritional quality of a diet for cats. It does not matter how well-formulated a diet if cats will not eat it.

To investigate the role of palatability, Petfood industries usually use expert panels of cats trained to discriminate food with different sensory properties. In the usual testing procedure, cats have the choice between two different diets presented simultaneously and available for several hours. The quantity of each food eaten and the dynamic of the consumption of each food during the test are used as indices of food palatability. The aim of our study was to enrich the classical palatability criteria by looking for differences in the behaviour of cats which could be attributed to palatability perception. To our knowledge only one study has examined the behaviour of cats during a food test (Van den Bos et al., 2000). In their study, cats were presented successively two canned diets differing in their level of palatability. The complete duration of each test session did not exceed 30 min and the cats were under their usual diet the rest of the time. The authors then described a "hedonic" taste reactivity pattern where cats licked and sniffed the feeding bowl, licked their lips and groomed their face, and an "aversive" taste reactivity pattern where cats licked and sniffed the food and licked their nose. Based on these results we decided to study the behaviour of cats at feeding occasions using two different dry food diets between which a known difference of palatability has been established using the classical expert panel evaluation. Dry food is strategic for petfooders because it is the most popular form of diet given and bought by pet owners (Crane et al., 2000). In order to respect the natural feeding rhythm of cats, each test lasted 20 h with the diet continuously available.

2. Methods

2.1. Animals

The experiments were conducted at Panelis, Diana Pet Food Division expert panels in palatability measurement. This center specialized in the evaluation of food palatability for dogs and cats is modelled on the real-life home environment and is committed to the well-being of pets and to the expertise in palatability measurement and to the observation of the feeding behaviour of dogs and cats. Cats were recruited between two months and three months of age from breeders and private owners. Kittens were always adopted by two, a male and a female from the same litter. The selected kittens were in good health and tolerant towards both conspecifics and human contact. From recruitment until approximately eight months of age, cats get accustomed to their new environment with other kittens in our catteries and to be in contact with different persons. They were trained with our experimental procedures (see below) and tasted different types of food from economical to super premium brands. The population of cats kept in the expert panel is representative of cat population in France (approximately 80% of European cats and 20% of purebred cats; FACCO/TNS SOFRES survey, 2012) and balanced in terms of age (from 8 months to 10 years) and sex. Because pet owners frequently sterilize males (81%) and females (75%) (FACCO/TNS SOFRES survey, 2012), the males of the expert panel were castrated at puberty and most of the females were sterilized. In the present study seventeen adult cats (5 ± 1.5 years old) have been used and six of them were purebred cats (one British Shortair, one Somali, one Chartreux and three Armenian Van). The cats were distributed into two groups, housed in two separate rooms several months before the beginning of the experiment. The rooms were equivalent in surface (13 m^2 indoor and outside) and equipment; three litters per room, toys and cat trees. Cats had a free access to an enriched outdoor courtyard. In our study, Room 1 contained three males and six females (all sterilized); Room 2 contained three sterilized males and five females with only one intact female.

2.2. Automated feeding system

Each room is equipped with two automated feeding stations (Fig. 1, Larose et al., 2007). At each visit and

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