

## 1. INTRODUCTION, AIMS OF THESIS, MAIN RESULTS

Three publications enclosed above kick around different aspects of rutting behaviour in fallow deer. To summarize shortly aims of thesis, we tried to explain the process of escalating an encounter, similarly to that one described for red deer stags. We specified factors affecting probability of physical combat. We investigated the role of fallow deer does by the bucks encounters and circumstances influencing females' tendencies to stay with or leave the buck. We also examined the special strategy of lek and compared a reproductive success of bucks defending a lek territory and those defending temporary stands by an indirect method.

According to literature, the course of an encounter between two male deer seems to be affected by three main proximate causes from the point of view of a female: presence of females, mating frequency and conception probability. To test this predictions, it was examined how decisive the presence of females is for the course of an encounter between bucks. The prediction was that when females are present, bucks should be motivated to show their status. Hypotheses were set that the presence of females near males enhances the frequency of encounters as well as the occurrence of fights and groaning compared to the situation when females are absent. Furthermore, the presence of females should also increase the number of incidences where there is a clear outcome of the fight. Results show that females were only present during half of the encounters between bucks. Furthermore, most of the fights escalating from encounters occurred in the absence of females. Vocalization and incidence of clear victory was not affected by the presence of females. This study failed to support the prediction that bucks are highly motivated to show their status in the presence of females. It is more likely that bucks did not reflect if there were any females nearby them during the encounters. It can be concluded that encounter components and fights were directed to other fallow deer bucks in order to monitor the current competitive abilities of their opponents, as previously suggested, rather than to decide about direct access to receptive females. Under the given social conditions, encounters between bucks did not lead to any imminent gain of females and, thus, mate choice was realized in some other way. Since we observed very few mating during the daytime throughout the four observation seasons in our study, it strongly suggests that males decided about access to receptive females soon before mating, which typically occurred during the night time.

In general, fighting success likely rules reproductive success according to various studies both on red and fallow deer. Therefore, it was attempted to determine if the result of an encounter affects the choice of a female (i.e. the shift of females between opponents). Those factors that may affect the probability of a female's desertion from one buck to his opponent during an encounter were examined. Assuming that the result of a fight is relevant for those present females, the following hypotheses were tested: 1. Females will stay in the harem of the winner of an encounter and will abandon the loser. 2. Females will desert to a buck with females rather than to a buck that is without them. Our data supports the idea that the outcome of an encounter impacts the decision of a fallow deer female to stay with or leave the male whom she accompanied prior to the encounter. This might suggest that the fighting success of males is important for mating success. On the contrary, it was found that the probability of a female to desert her buck was generally low. Therefore, this indicates that fighting success was not essential or exclusive for mate choice. However, our finding that the presence of any females



with the opponent decreased the probability of female desertion opposes the mate-copy theory.

Outlasting of the hierarchy from the pre-rut up to the rut and the tendency of adult fallow deer males to solve conflicts without antler contact contribute to a lower frequency of fights and decreased risk of serious injury. Vocalization (groaning), parallel walk and physical combat during the breeding season have been described by several authors. They have examined various aspects of rutting combats, such as vocalization rates, fighting tactics and techniques and factors affecting the duration of fights. It has been also demonstrated that the lateral presentation of the palmate antlers during a fight does not necessarily signify dominance and that the parallel walk between competing male fallow deer does not indicate a lateral display of individual quality. In this study we focused on a simple process of assessment of the opponent's fighting ability and the escalation of the combat, as described originally for red deer, estimating the probability of fighting based on the encounter components. We found that in 83% of the encounters of two adult bucks, at least one of the phases of displayed rivalry was utilized to estimate the opponent's ability. This result is very similar to that found in red deer study. Frequency of vocalization and parallel walk was even higher than in red deer. This suggests that adult bucks used non-contact techniques for reciprocal comparison of strength even more than the red deer stags in the aforementioned study. Unlike red we found that fallow deer would interrupt a fight and switch into another parallel walk. In agreement with other reports, our results suggest that fallow deer males use efficient tactics to avoid combat situations that may result in physical injury. The probability of a fight was lowest in those situations where the males displayed asymmetric behaviour. Higher symmetry of the contestants' behaviour was strongly correlated with a higher probability of a fight. A high proportion of fights without an obvious winner rejected our expectation that fights would mostly be terminated by the victory of one male. On the contrary, we found that for most encounters with a clear outcome, the encounter ended without the fight rather than escalating into a fight. Maybe evident victory of one male is not really that important. This would confirm the supposition that fighting is just a complement to vocalization and parallel walk, which are most important for establishing hierarchy during the rut. The fights in fallow deer may not be as severe as those that occur in red deer since parallel walk often occurred after combat. In agreement with earlier studies, we believe that vocalization, parallel walk as well as fighting are suspiciously about clearing up the dominance relationships. During the course of the rut, as body condition declines, the fighting ability of individual deer male changes. Individuals vary in the timing of their decline, so inter-relationships among the males is most likely highly dynamic. Consequently, any assessment of criteria that do not vary with changes in body condition during the rut can result in incorrect conclusions.

Compared to single-territory defence, lekking is a strategy, which only few males can afford, whilst alternative tactics are chosen by inferior competitors. Consequently, a hypothesis was set in this study that reproductive success would be higher in lekking fallow deer males compared to those defending temporary stands. Although mating success was described higher on leks than on isolated territories, our results showed that number of females in imminent proximity of focal male per minute of observation was significantly lower in the group of lekking males than in males on temporary stands. This finding is inconsistent both with expectations and with the literature. High population density (particularly adult male density) might support forming of lek in fallow deer. Nevertheless, in Březka population, sex ratio was diverted on the side of males, and therefore tactics of lekking perhaps fails to be the most efficient. Either non-territorial strategies or defending isolated territory brought presumably higher chance of reproductive success to rutting bucks. We conclude that potential reproductive success of lekking fallow deer bucks is definitely affected by the



population density, but sex ratio might be the fundamental factor determining effectiveness of different mating tactics.

## 1. ÚVOD, CÍLE PRÁCE, HLAVNÍ VÝSLEDKY

Tři níže uvedené publikace se zabývají různými aspekty říjného chování daňků. V krátkosti shrnuto, cílem této práce bylo: 1. objasnit proces eskalace střetnutí dvou samečů daňka skvrnitého, podobně jak byl dříve jinými autory popsán u jelena evropského. Snažili jsme se specifikovat jednotlivé faktory ovlivňující pravděpodobnost fyzického souboje mezi dvěma soupeři. 2. zkoumat roli samic (daněl) u setkání dvou samečů a okolnosti ovlivňující tendence samic zůstat u jednoho či odejít k jinému daňkovi. 3. Zabývat se speciální strategií leku a porovnat reprodukční úspěch daňků hájících teritorium na leku a hájících (dočasná) samostatná teritoria nepřímou metodou.

Podle dostupné literatury je střetnutí dvou samečů daňka ovlivněno z hlediska samic třemi hlavními proximálními faktory: přítomností samic, frekvencí páření a pravděpodobností zabřeznutí. Abychom otestovali tyto predikce, zkoumali jsme jak moc rozhodující je přítomnost samic pro průběh samčích střetnutí. Předpokládali jsme, že v přítomnosti samic budou samci velmi motivováni hájit svoji pozici. Stanovili jsme hypotézu, že přítomnost samic poblíž samečů zvýší četnost střetnutí mezi dvěma daňky, četnost výskytu soubojů i vokalizace v porovnání se situací, kdy samice přítomné nejsou. Přítomnost samic by také měla zvýšit četnost výskytu jasného vítězství jednoho ze soupeřů. Výsledky ukázaly, že samice byly přítomny pouze u poloviny střetnutí dvou samečů. Většina fyzických soubojů se odehrála v nepřítomnosti samic. Vokalizace a výskyt jasného vítězství nebyl přítomností samic nijak ovlivněn. Tato data nepotvrdila hypotézu, že samci budou vysoce motivováni hájit své pozice v přítomnosti daněl. Spíše se ukázalo, že samce prakticky nezajímá, zda jsou u jejich střetnutí přítomny nějaké samice. Jednotlivé komponenty samčích střetnutí a souboje slouží spíše jako signál jiným samecům pro porovnání momentálního stavu oponenta (jak se již dříve předpokládalo) než aby se na jejich základě rozhodovalo o přímém přístupu k receptivním samicím. V daném sociálním uspořádání nevedla střetnutí mezi samci k bezprostřednímu zisku samic. Výběr sexuálního partnera probíhal jiným způsobem. Protože jsme pozorovali velice málo páření v průběhu dne, předpokládáme, samci rozhodují o přístupu k receptivním samicím těsně před samotným pářením, které se typicky odehrává v nočních hodinách.

Podle závěru různých studií na jelenu evropském i na daňku skvrnitém lze obecně říci, že úspěšnost v soubojích ovlivňuje reprodukční úspěch. Proto bylo naší snahou určit, zda výsledek střetnutí ovlivňuje samčí výběr (tj. zda způsobí přesun daněl mezi soupeři). Zkoumali jsme faktory, které by mohly mít vliv na pravděpodobnost opuštění jednoho samce a připojení se k jeho soupeři v průběhu střetnutí. Za předpokladu, že výsledek střetnutí je důležitý pro přítomné daněly, testovali jsme následující hypotézy: 1. Daněly zůstanou v harému vítěze střetnutí a opustí poraženého soupeře. 2. Daněly spíše přejdou k daňkovi s danělami než k daňkovi bez daněl. Výsledky potvrzují domněnku, že výsledek střetnutí ovlivňuje rozhodnutí daněl zůstat u daňka, kterého doprovázely před střetnutím nebo přejít k