

## Starlings *Sturnus vulgaris* and cattle – a widespread feeding association

### *Starar Sturnus vulgaris och kreatur – en vida spridd födosökgemenskap*

HANS KÄLLANDER

---

#### Abstract

Most of this study was made in the extensive grasslands at Revinge, southernmost Sweden, but some data were also obtained in other parts of South Sweden. Starlings occurred significantly more often in pastures with than without cattle and also more often with active than resting cattle. Starlings were associated with cattle during all months from May to October, but predominantly in July and August. The birds followed grazing animals and pecked small insects from the vegetation close to the cattle's feet and mouth. There was a positive relationship between number of Starlings and the size of the herd they accompanied. Starlings arriving at a herd spread out among the cattle and, when

the total number of birds was high, often some birds left and formed flocks that foraged independently in the grass. Both observations suggest that the benefit of the association may be density-dependent. Pecking rates were higher, and speed of movement lower, for Starlings that associated with cattle than for those that foraged independently. In hot weather Starlings sometimes used a sit-and-wait tactic; when cattle were grazing in tall vegetation short flights after flushed insects were common.

*Hans Källander, Postv. 2, SE-240 12 T. Hällestad, Sweden  
(E-mail: kallander.hans@telia.com)*

---

Received 7 January 2004, Accepted 7 April 2004, Editor: T. Pärt

Although most field ornithologists probably know, or at least feel, that European Starlings *Sturnus vulgaris* often associate with cattle, this association has received remarkably little attention, the main exception being a paper by Stevens (1985). Commensal associations between birds and mammals are common, particularly it seems, in Africa (see review by Dean & MacDonald (1981), the best known being that between Cattle Egrets *Bubulcus ibis* and large mammals, including domestic cattle.

The present paper is a predominantly descriptive report on the association of Starlings with cattle based on observations made during more than two decades from the mid-1970s onwards, mainly in the Revinge area, South Sweden. Observations were made rather unsystematically and with varying intensity in different years, but in some years, especially 1981–1983, many days were spent observing the behaviour of the Starlings both at herds of cattle and when they were foraging on their own.

#### Methods

The vast majority of the observations were made in the Revinge area, Skåne, southernmost Sweden (c. 55°40'N, 13°27'E). Some data, however, such as on the presence of Starlings in pastures with and without animals, were collected in other parts of South Sweden: on the islands of Öland and Gotland in the Baltic, and in other areas of Skåne. Revinge is a c. 45 km<sup>2</sup> large, flat, military training area (with unrestricted public access), dominated by vast grasslands on predominantly sandy soil but also containing small woods, a small lake, marshes and some meadows with taller vegetation on richer soils. The grasslands are kept open by a large number of cattle that are allowed to graze over extensive areas; during the years of the present study, their total number in summer was about 2000, calves included. However, the cattle were separated into two main herds, with about equal number of animals on each side of a disused railway that passes through the area.

Some young cows were also kept separated from the rest of these herds in somewhat smaller enclosures. The big herds often split into smaller units that grazed different parts of the range. Not all of the grassland was grazed simultaneously, but from time to time the herds were moved to a new area. Some parts of the grassland were used for haymaking; these were grazed afterwards (mainly in August and later).

Data on the occurrence of Starlings in relation to presence of cattle were collected by visiting as many independent sites as possible and by restricting the records to pasture habitats that appeared suitable to Starlings. This meant that pastures with and without cattle were matched as far as possible with respect to vegetation height, etc.; practically all data originate from natural or semi-natural pastures. As with the data on the relationship between numbers of cattle and numbers of Starlings these data were collected in a variety of places in South Sweden.

The age structure of Starling flocks was studied both at herds and in the surrounding grasslands at Revinge. To determine if Starlings gained energetically by associating with cattle, during timed series I counted the number of pecks they made and, partly during other timed series, the distance they moved by using a Starling's body size, small tussocks, etc. as scales and points of reference.

## Results

### *Do Starlings associate with cattle?*

A comparison of presence of Starlings on pastures with and pastures without cattle (matched, as far as possible, with respect to vegetation) shows a clear preference of Starlings for the former ( $\chi^2 = 69.4$ ,  $df = 1$ ,  $P < 0.001$ ,  $N = 283$  pastures). Starlings also preferred pastures with actively grazing animals to pastures with resting ones ( $\chi^2 = 6.49$ ,  $df = 1$ ,  $P = 0.011$ ,  $N = 106$ ). Also, in situations when both resting and actively grazing cattle were present, Starlings chose to associate with the latter, as illustrated by the following two observations. Only one of 23 resting cattle in a grazed coastal hayfield had an associated Starling, whereas 18 of the 25 simultaneously grazing ones had so. At another coastal site 10 out of 19 grazing cattle had closely associated Starlings versus only three of 77 resting animals (Fisher Exact Tests, 2-tailed  $P < 0.001$  in both cases). The preference for actively grazing cattle was also often very obvious at the large herds at Revinge, where, for instance, 30 independent

landings by arriving Starlings were at actively grazing animals vs only four at resting cattle despite the fact that the number of resting cattle on these occasions by far outnumbered those grazing. Starlings followed grazing cattle herds over long distances. Also when a herd turned 90, or even 180 degrees thus turning back to where it came from, Starlings remained associated.

### *Seasonal occurrence of cattle-following*

In the following I use the term 'close association' to mean situations in which the Starlings were feeding by pecking (or jumping/flying after flushed insects) close to the mouth and feet of cattle while simply 'association' means that they were feeding in the very near vicinity of cattle, sometimes by using other feeding methods, notably probing. The distinction is not clear-cut, however, because Starlings may walk around the mouth and feet of a cow and then move out in the surrounding grass, perhaps later returning or associating with another animal.

Starlings were seen closely associated with cattle during all months from the end of April to mid-October (Figure 1). Differences between months in my field activity were small in the years during which these data were collected, so the Figure gives a reasonably fair general picture of the seasonal occurrence of the Starling-cattle association—except

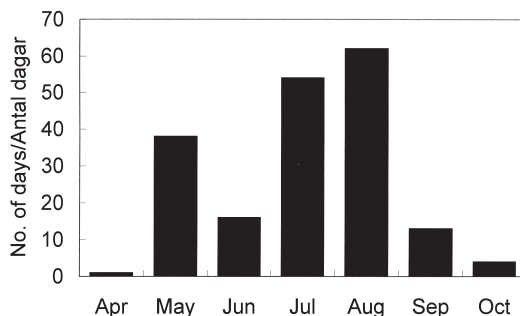


Figure 1. Seasonal occurrence of the Starling-cattle association in South Sweden. The Figure gives the number of days in each month on which Starlings were observed to associate with cattle during the years of study. Because in July and August associated Starlings were often seen at many herds on a particular day, the Figure severely underestimates the true occurrence in these months.

*Den årstidsmässiga förekomsten av associationen mellan starrar och kreatur. Figuren redovisar antal dagar för varje månad under studieperioden, då associationen iakttoogs. Eftersom starrar förekom vid många fler hjordar under en enskild dag i juli och augusti än under övriga månader så underskattar figuren kraftigt förekomsten under dessa båda månader.*

in two important respects. First, Figure 1 is based on the number of days rather than the number of instances that the association was observed in each month. Because in July and August the association was often seen in numerous places on a particular day, which was not the case in May, the occurrence in July and August is severely underrepresented. Second, Figure 1 does not account for the length or intensity of the Starlings' association with cattle; as seen below, these varied between months.

The Starlings at Revinge normally started laying in the last week of April or first week of May (Karlsson 1983, own unpubl. data), the eggs hatching some 15–17 days later and the young fledging in the first week of June. Close association of Starlings with cattle during May mostly occurred in warm weather and may have involved non-breeders in addition to off-duty breeding birds. In the second half of May, when parent Starlings were collecting food for the nestlings, they sometimes landed close to cattle, fed for insects for a short time while closely associated with the cattle, and then switched feeding method to probing for tipulid larvae that were brought back to the nest. On at least one occasion Starlings were also seen flying with a load of food into a herd, where they then picked insects (probably dung beetles) before taking off for the nest. Although close associations with cattle were mostly brief during May, flocks of Starlings were also seen following cattle closely for long periods and distances, just as later in summer. However, all but two of these instances were before the eggs had hatched. After hatching, the association with cattle was much less pronounced and feeding was mainly by probing, whether within a herd of cattle or not.

The pattern was similar during the first half of June, both when young still remained in the nest and from fledging until the young had become independent, as reflected by the fact that only five of the 16 observations in June refer to this period. It was not until the last five days of the month that cattle-following became common. Close association with cattle then remained widespread and common during July and August, in some years also in warm weather in the first days of September. In October, Starlings associated closely with cattle only on warm, sunny days.

#### *Size of herd and number of Starlings*

As Figure 2 shows, there was a clear positive relationship between the number of cattle in a herd and the number of its associated Starlings. Note,

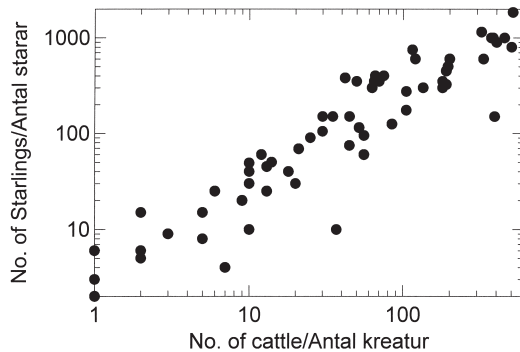


Figure 2. The relationship between number of cattle in a herd and number of its associated Starlings. Observations of large herds containing low numbers of Starlings have not been plotted, because the interesting question is whether an upper limit to the number of birds per cattle exists.

*Relationen mellan antalet kreatur i en hjord och antalet associerade starar i denna. Stora hjordar med låga antal starar har inte plottats eftersom den intressanta frågan är om det existerar en övre gräns för antalet starar per kreatur.*

however, that numerous observations of low numbers of Starlings relative to number of cattle have not been included as these are of little interest for the understanding of the dynamics of the system. In most cases it was impossible to verify that all the Starlings present in a herd actually foraged in close association with an animal even though the birds were feeding inside the herd or were following it as it moved. For this reason, the line indicating how many Starlings a herd of cattle of a certain size can 'support' would no doubt fall below the maximum values. Even so, Figure 2 suggests that there is an upper limit to the number of Starlings that can profitably use a herd of a particular size. A calculation excluding zero values gave a mean of 3.2 closely associated Starlings per cow at Revinge (N = 59 cows, data from seven different days).

#### *Starlings' behaviour at the herds*

Observations on the behaviour of the Starlings all refer to the permanent grasslands and natural hayfields at Revinge, where the cattle herds numbered between 60 and some 500 head. Mostly, when a herd started grazing after a period of rest, the first animals to begin to graze formed a straight or slightly curved front perpendicular to the direction of movement, the rest of the herd following. When a flock of Starlings arrived at a herd, the birds almost invariably spread out among the cattle. Likewise, when Starlings

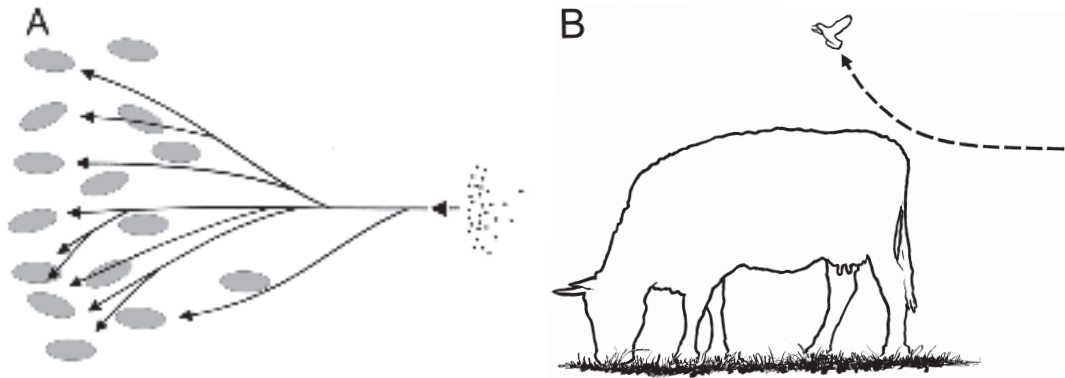


Figure 3. Schematic representation of the way Starlings tended to distribute themselves when flying out over a grazing herd of cattle (A) and a behaviour often seen before Starlings landed in a herd (B). In (A) ellipses represent cattle and dots Starlings. *En schematisk bild av hur starar fördelade sig över en betande kreaturshjord (A) och ett beteende enskilda starar ofta visade innan de landade (B). I (A) representerar ellipserna kreatur, punkterna starar.*

flew from the rear of a moving herd towards the grazing front, the birds spread out (Figure 3 A). Before landing, especially when total numbers were high, they sometimes rose a bit into the air as if they were monitoring the ground below before they either settled or continued (Figure 3 B).

Starlings, especially juveniles, appeared to prefer a position within the front of the herd, both when cattle were grazing in a defined direction and when a herd walked relatively fast, e.g. to reach one of the drinking places. This often resulted in a much higher density of Starlings in the front third of the herd than in the rest of it. When the total number of Starlings was high relative that of cattle, after a while birds arriving from further back started overshooting the herd and landing a bit ahead of the front of grazing animals. This distance often gradually increased over time and sometimes led to the formation of a flock that foraged in the grass independently of the cattle. Often in such situations there was a constant switch between independent foraging and cattle-following, resulting in much flying.

On some occasions when a herd was grazing slowly with attending Starlings spread out among the animals, and a small group of cattle for some reason started walking fast, such as when a cow in heat tried to avoid an escorting bull or a group of male calves, Starlings immediately flew there and landed with them. This suggests that it was more profitable for the Starlings to forage in association with fast-moving than slowly grazing cattle. However, the Starlings' reaction to the cattle's speed of movement was complex; on seven recorded occasions

Starlings did the opposite, namely left fast-moving animals for ones that were grazing slowly.

As ruminants, cattle show cycles of grazing activity and rest. As herds became inactive, associated Starlings responded in different ways. Quite often small flocks left the area altogether, but in the majority (c. 60%) of cases Starlings started foraging independently of the cattle. This could be either in one or more flocks up to many hundred metres away from the herd or within the resting herd or, usually, both. In very hot weather, Starlings often simply rested together with the cattle, preening or sunbathing, and resumed foraging as the cattle again became active. On three occasions Starlings were seen hawking insects above the resting herd in hot weather and, on one or two, picking insects off the resting animals.

#### *Behavioural differences between adult and juvenile Starlings*

During July and August, juveniles at Revinge showed a much stronger tendency than adults to form foraging flocks that foraged independently in the grassland, especially in tall grass. In none of 15 flocks (40–750 individuals) in tall vegetation did the percentage of adults exceed 5%. In fact, only two of the flocks contained any adults at all. Similarly, in 22 flocks, for which the height of vegetation was not recorded, the mean proportion of adults was also 5%. In another 10 flocks that were foraging within sight of a grazing herd (mostly after having left it), adults on average made up only 20%. In contrast, among Starlings

associated with cattle, on average c.70% were adults, but there were also cases when juveniles dominated strongly. This difference between the age classes can be illustrated by two instances when the Starlings flew up in response to some disturbance: whereas the adults flew to the cattle, the juveniles flew out into the grass. Among Starlings foraging on their own in newly cut hayfields, adults likewise outnumbered juveniles (mean for adults 85%,  $N = 5$ ).

Also on the level of the herd the age-classes appeared to be segregated to some extent. In 10 out of 14 cases, the proportion of juveniles was higher in the front or immediately outside it than that of adults, whereas the reverse was true within the herd. In two additional cases when juveniles dominated in total, their proportion was higher at the front of the herd than in the middle. This segregation by age did not seem to be caused by overt aggression. Adult Starlings in particular were rarely involved in agonistic encounters in contrast to independently foraging juveniles, which often fought over a patch, probably mostly at ant nests that they had discovered.

#### *Foraging methods*

When Starlings were closely associated with cattle (Figure 4), their main feeding method was picking prey from the vegetation. They tended to walk close to the mouth and feet of the cattle, sometimes making a small detour into the surrounding grass. On some occasions a Starling sat or walked so close to a cow's head that it was risking being seized by the animal's tongue. The prey taken appeared usually to be small. However, when foraging inside a herd, not only did Starlings sometimes pick insects from the vegetation far enough from a cow or calf to exclude a direct beater effect, but sometimes they formed a small group that fed mainly by probing. Normally, however, feeding when associated with cattle was by picking. As an illustration, on 25 May 1976, when it was quite wet after a rainy day, a group of Starlings was feeding on earthworms by probing. Something scared them and they took off and landed close to grazing cattle. There they immediately changed their foraging method to picking as they started following the animals closely.

When cattle were grazing in tall grass they flushed larger prey, such as small moths, which the Starlings chased by a quick rush or a short flight. In windy weather this activity was concentrated to the lee side of the animals. Likewise, in windy conditions Starlings arriving at a grazing cow showed a very clear tendency to land on the lee side. A couple of

times when a herd was on the move, large numbers of insects rose above it. In such situations Starlings flew up and captured the insects in the air. On a few occasions in hot weather, rather than walking constantly with a cow, a Starling would use a sit-and-wait tactic, watching out for any large prey that the grazing animal disturbed. Taking insects directly from cattle was observed only exceptionally when Starlings jumped up and captured what was probably blood-sucking tabanids from the belly and lower sides of the animal.

#### *Pecking rates and speed of movement: Starlings associated with cattle versus foraging independently*

It was difficult to obtain simultaneous data on pecking rates and speed of movement of Starlings feeding with and without cattle at the same site. However, on six occasions when data were obtained both for Starling individuals foraging closely associated with cattle and for individuals foraging some distance away from them (but mostly well within the herd), the former had higher pecking rates on five. For all data combined, Starlings that foraged closely associated with cattle had significantly higher pecking rates than Starlings foraging independently (0.40 pecks/s [SD 0.16] vs 0.27 pecks/s [0.9], Mann-Whitney U-test,  $z = 2332$ ,  $P < 0.001$ ,  $N_1 = 76$  series,  $N_2 = 41$  series). They also moved more slowly than independently foraging Starlings, 2.8 m/min (SD 0.8) versus 10.5 m/min (7.4), a statistically significant difference (Mann-Whitney U-test,  $U = 0$ ,  $P < 0.001$ ,  $N_1 = 18$  series,  $N_2 = 15$  series).

#### *Observations of Starlings associating with horses and sheep*

While I have notes on Starlings' association with cattle from c. 250 days, there are corresponding notes on their association with horses and sheep from only three and four days, respectively. To a large extent, of course, this is explained by the fact that most of my studies were carried out in the Revinge area, where there were no horses and where sheep were kept only in a few years, within small areas and in low numbers. However, important reasons why horses appear not to be a regular host of commensal Starlings is the way that horses graze and that they often occur on pastures with a very low sward. A close association with sheep is probably more common, namely in areas where sheep are kept in habitats with tall grass or tall grass with low



shrubs, such as on the island of Öland in the Baltic. The few observations I have are from such habitats (including on Öland), where Starlings associated closely with sheep in a way that in all respects resembled their association with cattle.

## Discussion

In summer Starlings in South Sweden preferred pastures with cattle to pastures without cattle, and active cattle to resting ones, as previously shown in Belgium (Stevens 1985). Pecking rates were also higher when associated with cattle. Although Keys & Dugatkin (1990) warned against using pecking rates as a substitute for prey capture rate, in the present comparison, they probably reflect a true difference in capture rate between Starlings associated with cattle and Starlings foraging independently of cattle. My results thus suggest that the benefit to Starlings of associating with cattle is increased prey capture rate. Normally, closely associated Starlings also walked less than independently foraging Starlings in the same habitat, probably resulting in a smaller energy expenditure.

Higher pecking rates of Starlings when associated with cattle were also found by Stevens (1985) and have been reported for two species of ani *Crotophaga* spp. (Rand 1953, Smith 1971) and for Yellow Wagtail *Motacilla flava* (Källander 1993). Similarly, prey capture rates have been found to be higher when Cattle Egrets associate with large herbivores, including domestic cattle (e.g. Heatwole 1965, Grubb 1975). In commensal associations such as those, it has been assumed that the herbivores act as beaters or flushers, making insects fly or move, thus increasing their detectability. This is the impression an observer gets when watching cattle (or other large animals) move through tall grass and forbes disturbing grasshoppers, moths and other medium-sized insects.

Whereas a foraging benefit to starlings of following cattle in such situations seems obvious (see Löhrl 1965), a beater effect is much less evident to an observer in some situations when cattle graze in lower vegetation, but this may depend on the fact that prey there is much smaller. This point was also made by Goguen & Matthews (1999) in their study of the association of Brown-headed Cowbirds *Molothrus ater* with cattle, an association that appears to have many similarities with that between Starlings and cattle.

However, it could be that Starlings benefit in an additional way from associating with cattle, namely by the reduced vegetation height resulting from grazing, which might facilitate probing into the turf. However, if this were true, one would expect Starlings to associate with horses much more often than is the case. Also, there would be no reason for Starlings not to feed in an area that has already been grazed but that the cattle have left (Goguen & Matthews 1999).

Another benefit to Starlings of associating with cattle could be the insects they attract, especially dung beetles, which seemed to play some part in the diet of Starlings during spring. However, dung beetles appeared not to be important during July and August, the months when cattle-following was most common. Although other benefits cannot be excluded, my conclusion is that by associating with cattle Starlings can increase their intake rate because cattle's activities disturb prey and so make prey more visible to the Starlings.

There was a positive relationship between the size of a cattle herd and the number of its associated Starlings, suggesting that the benefit to Starlings of foraging together with cattle might be density-dependent. The higher density of Starlings in the front and first third or so of a grazing and moving herd may also suggest that the birds' reward was higher there than in the middle and rear of the herd. When number of Starlings was high relative to number of cattle, birds flying towards the grazing front tended to overshoot the herd and land in front of it. Sometimes this resulted in (juvenile-dominated) flocks that left the herd and started foraging on their own, indicating that independent foraging might have become more profitable than staying in the crowded situation within the herd. It should be emphasized, however, that this is a speculation that needs to be tested in the field.

Gerhardt & Taliaferro (2003) showed that Cattle Egrets tended to distribute themselves in equal numbers between two horses. It is likely that the tendency of the members of a Starling flock to

---

Figure 4. Starlings associating with cattle, Revinge. Top: A flock of Starlings landing at, and in front of, a rather fast-moving bull. Middle left: Starlings foraging in the grass between grazing cows. Middle right: A Starling scanning the vegetation close to a cow's mouth. Lower left: A Starling in the typical 'sit-and-wait' posture. Lower right: Starlings closely following the hindlegs of a grazing cow.

*Starar associerade med kreatur, Revinge. Överst: En starflock landar vid och framför en raskt travande tjur. Mitten, t.v.: Starar födosöker i gräset mellan betande kreatur. Mitten, t.h.: En stare spanar i vegetationen nära en komule. Nederst, t.v.: En stare i typisk 'sitta-och-vänta'-attityd. Nederst, t.h.: Starar som följer i bakhasorna på en betande ko.*

spread out when arriving at a heard is a similar phenomenon and that the behaviour shown by individual birds of rising in the air above grazing cows is a way of monitoring the local density of associated Starlings.

Whereas such independently foraging flocks that formed outside a herd mostly consisted of juveniles only, and juveniles often made up a very high proportion in the front of a herd, adults tended to stay within the herd, often in its middle parts. One reason for this may be that adults moult in summer and therefore may be less willing to fly and prefer to feed in lower vegetation. This gets some support from the fact that adults constituted 85% in flocks in newly cut hayfields. Independently foraging flocks of juveniles often fed in tall vegetation, sometimes foraging with a 'wheeling' movement, with birds from the rear end of the flock constantly flying to the front. For some insectivores (e.g. anis, Rand 1953, Whinchats *Saxicola rubetra*, Draulans & Van Vessem 1982), it has been suggested that, by moving together in a flock, the birds themselves act as beaters, leading to a higher intake rate than if each bird would feed solitarily. Although plausible (cf. Götmark et al's (1986) experiment with Black-headed Gulls *Larus ridibundus*), this hypothesis was refuted by Scott (1984), at least for Cattle Egrets (which have been observed to 'leap-frog' or 'wheel' [Wiese & Crawford 1974]). Scott explained the higher capture rate of egrets in flocks as a result of birds gathering in patches rich in prey.

As for kleptoparasites, the time-budget of commensals, such as Starlings and other cattle-followers, will be influenced by that of their hosts. Thus, during periods of the day when cattle rest and ruminate, the benefit Starlings gain from the association temporarily disappears and they have to choose whether to stay with the cattle or not. Stevens (1985) showed that there were many more Starlings present, and that they were present for longer periods, during the cattle's grazing bouts than during periods of rest. Although I neither quantified the activities of Starlings during such resting periods nor the number of Starlings at active versus resting herds, my observations qualitatively support his results. Especially juvenile Starlings left resting herds and formed flocks that foraged independently in the grass. In other situations also the Starlings rested and preened when cattle rested – just as in Stevens' study, in which preening occupied 15 times more of the Starlings' time at resting than at active cows.

Although the association of Starlings with cattle is a very wide-spread phenomenon, the question of

course is whether or not it plays any important role in the economy of the species. At Revinge, it seemed that sometimes more Starlings were foraging independently of cattle than associated with them, at least during periods when total Starling numbers were very high. However, a necessary basis for answering this question are quantitative data on the number of Starlings in different habitats and locations. Perhaps areas of permanent or semi-permanent grass are more important than the presence of cattle even though Starlings' intake rates appear to be higher when associated with cattle and that Starlings therefore may prefer to associate with cattle rather than forage independently.

## References

- Dean, W.R.J. & MacDonald, I.A.W. 1981. A review of African birds feeding in association with mammals. *Ostrich* 52: 135–155.
- Draulans, D. & van Vessem, J. 1982. Flock size and feeding behaviour of migrating whinchats *Saxicola rubetra*. *Ibis* 124: 347–351.
- Gerhardt, F. & Taliaferro, E.H. 2003. Density-dependent patch selection by foraging cattle egrets. *Waterbirds* 26: 364–369.
- Goguen, C.B. & Matthews, N.E. 1999. Review of the causes and implications of the association between cowbirds and livestock. *Studies in Avian Biology* 18: 10–17.
- Götmark, F., Winkler, D.A. & Andersson, M. 1986. Flock-feeding on fish schools increases individual success in gulls. *Nature* 319: 589–591.
- Grubb, T.C., Jr. 1976. Adaptiveness of foraging in the cattle egret. *Wilson Bull.* 88: 145–148.
- Heatwole, H. 1965. Some aspects of the association of cattle egrets with cattle. *Anim. Behav.* 13: 79–83.
- Källander, H. 1993. Commensal feeding associations between Yellow Wagtails *Motacilla flava* and cattle. *Ibis* 135: 97–100.
- Karlsson, J. 1983. Breeding of the Starling (*Sturnus vulgaris*). *Doctoral thesis, Department of Animal Ecology, Lund University.*
- Keys, G.C. & Dugatkin, L.A. 1990. Flock size and position effects on vigilance, aggression, and prey capture in the European starling. *Condor* 92: 151–159.
- Löhrl, H. 1965. Schafstelzen, Stare und Weidetiere. *J. Ornithol.* 106: 114–115.
- Rand, A.L. 1953. Factors affecting feeding rates of anis. *Auk* 70: 26–30.
- Scott, D. 1984. The feeding success of cattle egrets in flocks. *Anim. Behav.* 32: 1089–1100.
- Smith, S.M. 1971. The relationship of grazing cattle to foraging rates of anis. *Auk* 88: 876–880.
- Stevens, J. 1985. Enkele aspecten van de associatie van Spreeuwen *Sturnus vulgaris* met koeien. *Wielewaal* 51: 41–46.
- Wiese, J.H. & Crawford, R.L. 1974. Joint "leap-frog" feeding by ardeids. *Auk* 91: 836–837.



## Sammanfattning

Ett antal fågelarter är kända för att associera sig nära med betande fyrfotadjur, inklusive kor. Den mest kända och studerade av dessa är kohägern *Bubulcus ibis*, men speciellt i Afrika tycks fågel-däggdjursassociationer vara vanliga (se review av Dean and MacDonald 1981). Hos oss torde flertalet fältornitologer ha åtminstone en känsla av att starar tenderar att associera sig med kreatur och att denna associering är mycket vanlig under sommarmånaderna. Trots detta har fenomenet rönt föga uppmärksamhet; i endast en studie har det granskats närmare (Stevens 1985). Under drygt två decennier gjorde jag mer eller mindre osystematiska iakttagelser av starars associering till kreatur, framför allt på Revingefältet i södra Skåne, men också på Öland, Gotland och andra platser i Sydsverige.

Det c. 45 km<sup>2</sup> stora pansarövningsfält, som Revingefältet utgör, består till stora delar av vidsträckt permanenta gräsmarker, vilka under 1980-talet då merparten av data insamlades, sommartid betades av totalt cirka 2000 kor och kalvar. Dessa var uppdelade på två stora hjordar samt några mindre. De stora hjordarna flyttades då och då mellan olika områden, men hade (utom i samband med militära övningar) tillgång till stora arealer. Nedan redovisas resultaten från denna i huvudsak rent deskriptiva studie.

## Resultat

Data från olika lokaler i Sydsverige, de flesta från Skåne, visar att starar förekom signifikant oftare på betesmarker med kreatur än på motsvarande betesmarker utan djur ( $P < 0,001$ ). Likaledes föredrog de beten med aktivt betande framför passiva, rastande djur ( $P < 0,001$ ). Denna preferens för betande djur var också tydlig inom en hjord, där betande kreatur hade betydligt större chans än vilande djur att attrahera starar. Starar följde ofta betande hjordar långa sträckor även när dessa ändrade riktning (ibland med 180 grader, dvs betade sig tillbaka mot utgångspunkten).

Starar associerade sig med kreatur under hela perioden maj–oktober, men företrädesvis under juli och augusti (Figur 1). Under den första halvan av maj, stararnas ruvningstid, förekom nära associering till kreatur mest i varmt väder och kan ha omfattat såväl icke-häckare som den av parterna, som för tillfället inte var upptagen av ruvning. Sedan äggen kläckts var stararnas födosök nästan uteslutande inriktat på marklevande evertrebrater, främst harkranklarver, och den associering till kreatur som förekom var av kortvarig natur. Detta mönster bibehölls i stort sett tills de unga stararna blivit självständiga.

Först under den sista juniveckan blev associeringen till kreatur mera omfattande. Juli och augusti var de två månader då associeringen var mest framträdande. I själva verket underskattar Figur 1 kraftigt förekomsten under dessa månader, eftersom den bygger på antalet dagar då associering till kreatur iakttagits, oavsett om företeelsen registrerats vid ett eller många tillfällen. Under september, och framför allt under oktober, associerade sig starar på Revingefältet till kreaturen endast under varma och soliga dagar.

Som Figur 2 visar, fanns det ett klart samband mellan antalet kreatur och antalet starar med nära anknytning till hjorden. Observera dock att många observationer av låga antal starar i stora hjordar inte redovisas, eftersom de inte tillför något till frågan huruvida den fördel stararna har av associationen är täthetsberoende. Betande hjordar utbildade ofta en bred betesfront, som rörde sig i en viss riktning följt av resten av djuren. När starar anlände till en betande hjord, spred de ut sig mellan de betande djuren, företrädesvis i fronten (Figur 3A). Ibland stannade de upp i luften innan de antingen fällde eller fortsatte till en annan del av hjorden, ett beteende som gav intryck av att de bedömde hur ”trångt” det var på platsen (Figur 3B). Vid höga startätheter – totalt i hjorden eller i fronten – började fåglar efter en stund fortsätta förbi fronten och falla strax framför. Ibland ökade detta avstånd successivt så att bakifrån kommande starar kunde fälla flera tiotals meter framför hjorden. I de situationerna utbildades ofta friprovianterande flockar, vilka drog ut i gräsmarkerna. Dessa flockar var alltid kraftigt ungfågeldominerade. Samma sak gällde för starflockar, som födosökte på olika ställen i gräsmarkerna långt från kreaturs-hjordarna. Dessa innehöll i medeltal blott 5% adulta starar och det alldeles övervägande antalet flockar innehöll inga gamla fåglar alls. Vid hjordarna var ungfågelsandelen ofta hög i och just utanför fronten medan gamla starar ofta dominerade antalsmässigt längre bak i hjorden.

Som idisslare kännetecknas kreaturs dygnsrytm av en växling mellan perioder av aktivt betande och perioder av vila. När en sådan viloperiod inträdde, lämnade ofta små flockar av starar området helt och hållet medan andra, oftast ungfågeldominerade, flockar flög ut i den kringliggande gräsmarken och friprovianterade. Andra starar stannade inom eller helt nära hjorden, varvid de ibland ändrade födosöksmetod från pickande till att borra med näbben i gräsvålen. I mycket varmt väder rastade ofta stararna tillsammans med de vilande kreaturen, varvid de

ägnade mycken tid åt putsning. När kreaturen åter blev aktiva, återgick stararna till att följa dem.

Kreatursföljande starar födosökte ofta nära ben och mular (Figur 4), varvid de pickade i vegetationen, där de sannolikt tog små insekter, vilka röjdes genom kreaturens aktivitet. Ibland gav de sig ut på små turer i det omgivande gräset för att efter en stund åter uppsöka samma eller ett annat kreatur. I högre vegetation, särskilt när kreaturen rörde sig litet snabbare, var ruscher och korta flygturer efter uppskrämda småfjärilar och andra medelstora insekter vanliga; i varmt väder förekom också en "sitta-och-vänta"-taktik: staren satt stilla i sträckt hållning och spanade för att kasta sig fram om någon insekt skrämde av det betande djuret. Några gånger i varmt väder fångade stararna också insekter några meter ovanför en raskt marscherande hjord. Däremot togs ytterst sällan några byten direkt från kreaturen. De få fall som sågs torde ha handlat om blodsugande bromsar.

Det var svårt att få data på pickningsfrekvens (som ett surrogat för antalet tagna byten per tidsenhet) från kreatursföljande och friprovianterande starar i samma område och vid samma tillfälle, eftersom stararna hela tiden tenderade att födosöka nära kreaturen. Vid fem av sex tillfällen var antalet pickningar per tidsenhet högre för starar, som var nära associerade med kor, än för starar som födosökte i gräset en bit bort från närmsta kreatur. Pickningsfrekvensen baserad på 71 serier tagna på starar nära associerade med kreatur var högre än den i 41 serier tagna på friprovianterande starar under så likartade förhållanden som möjligt (i medeltal 0,40 pickningar/s mot 0,27). När stararna födosökte bland kreatur, som betade i normal takt, förflyttade de sig också avsevärt kortare sträcka per tidsenhet än friprovian-

terande starar i motsvarande habitat, i medeltal 2,8 m/min mot 10,5 m/min. Både dessa skillnader är statistiskt signifikanta ( $P < 0,001$ ).

Starar associerade sig sällan med hästar eller får. De gånger de sågs följa får var i högre vegetation (t.ex. på Öland), varvid deras beteende var detsamma som när de följer kreatur.

### *Diskussion*

Denna, liksom Stevens (1985) studie visar entydigt att starar i större utsträckning uppsöker betesmarker med än utan kreatur och att de förekommer oftare på beten med aktiva än med passiva djur. Starar vid Revinge följde också betande hjordar långa sträckor, även när dessa ändrade riktning. Det fanns ett positivt samband mellan antalet kreatur i en hjord och antalet starar, som följde hjorden. Vid höga startätheter tenderade speciellt unga starar att bilda friprovianterande flockar, vilket kan tolkas som att den fördel stararna har av associationen är täthetsberoende. Vilken är då denna fördel? Den rimligaste är naturligtvis att stararna genom att följa kreatur får ett högre energiintag än när de friprovianterar, åtminstone så länge antalet starar per kreatur inte är alltför högt. En ökad effektivitet i bytesfångandet har använts som förklaring till flera liknande kommensala associationer och har också demonstrerats för bl.a. kohägar (Heatwole 1965, Grubb 1975), två arter anier (Rand 1953, Smith 1971), gulärta (Källander 1993) och stare (Stevens 1985, denna studie). I såväl studien av gulärta som i föreliggande starstudie hade fåglar, som var associerade med betande kreatur, lägre rörelsehastighet, vilket också bör ha inverkat positivt på fåglarnas energibalans.