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DOUBLE BROODS, POST-HATCHING BROOD AMALGAMATION AND OTHER NOTES ON THE BREEDING BIOLOGY OF EGYPTIAN GEESE *ALOPOCHEN AEGYPTIACUS* IN THE NETHERLANDS

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ABSTRACT

This paper reports preliminary results on the breeding biology of a spontaneous settlement of Egyptian Geese *Alopochen aegyptiacus* in the city of Groningen, The Netherlands. The focus lies on breeding results of a marked pair in six consecutive years (2010-2015). This pair raised fledglings in all of these years. At least 45 young were hatched in 2010-2015 of which 37-40 (82-89%) fledged. The pair had a successful double brood in 2013 and in 2014. There are only a few confirmed records of double broods, all concern recent observations in Europe. Post-hatching brood amalgamation in this pair was documented in 2014, one day after the second clutch hatched. This is to my best knowledge the first confirmed record of post-hatching brood amalgamation for this species. Six fledglings of the study population were recorded breeding (four raised fledglings), all were females with natal philopatry. An earlier record in Groningen concerned a male from Germany with natal dispersal, indicating sex bias for this parameter. Data on location and timing of moult of breeding birds show much variation. The study highlights the importance of marked birds to assess details on breeding biology. It is as yet unclear if the findings indicate major differences with the African population.

INTRODUCTION

The Egyptian Goose is a widespread breeding bird in most parts of sub-Sahara Africa (Scott and Rose 1996, Maclean 1997). A rapidly expanding population is nowadays also breeding in several countries in NW Europe, with The Netherlands as a stronghold (Gyimesi and Lensink 2012). The species breeds year round both in Uganda and in South-Africa (Eltringham 1974, Little *et al*. 1995), the laying period in the delta of the river Senegal stretches between July and February (Triplet *et al.* 1993). The breeding season in NW Europe peaks in the boreal spring and summer, though single pairs with freshly hatched young can be observed throughout the year (Sutherland and Allport 1991, Venema 1992, Lensink 1999, Andris *et al.* 2011, own data).

Menke *et al.* (2010) were the first to publish a confirmed record of a double brood of this species, but several aspects of the breeding biology are still poorly documented (Cramp and Simmons 1980). Here, I report the first fully documented record of post-hatching brood amalgamation in Egyptian Geese (see Eadie *et al.* 1988, Beauchamp 1997, Kalmbach 2006 and Lyon and Eadie 2008 for backgrounds and reviews), together with new records of double broods. The records concern the same pair. The observations are presented in the context of a detailed account of the breeding results of this pair for a period of six years, together with notes on the timing of wing moult. Presenting such a detailed account in a life-history context is in line with recommendations in Kalmbach (2006) and in Lyon and Eadie (2008) that more empirical data are needed to strengthen the theoretical models on costs and benefits of brood amalgamation.

METHODS

The breeding biology of Egyptian Geese in the city of Groningen, The Netherlands, has been studied by the author since 2009. The most intensively visited study area is the Noorderplantsoen (N53°13';

E06°33'), a city park of 20 ha near the city centre. The study population is partly marked, ringing takes place since 2010. The study population is a spontaneous settlement. Breeding pairs were intensively followed throughout the entire breeding period, often by daily visits to the breeding territory. The birds are used to people in their immediate surroundings and they are mostly easy to locate. Assessing details on breeding biology is thus straightforward. Nests were located by following incubating females until they returned to the nest. Nests were not visited. Pairs were visited daily around hatching and around fledging, hatching date and fledging date are defined as the first day with young (given daily visits), respectively the first day when the pair and (some of) their fledglings were not present anymore (given daily visits). Calls were used to separate both sexes, differences in the amount of white at the dorsal side of the greater and median upper wing-coverts were used for ageing (see Cramp and Simmons 1980 for details). Identifying second calendar year (2CY) birds is only applicable before the first complete moult. Adults are >2CY, unless otherwise stated. Wing moult was scored from 0 to 5 according to Ginn and Melville (1983). Definitions of brood amalgamation follow Eadie *et al.* (1988). Records before 2009 refer to observations by the author.

RESULTS

The preamble: 1990s-2009

An unringed pair of which one of the adults was pinioned resided in the southern part of the Noorderplantsoen in the 1990s. The pair raised fledglings in 1998 and 1999. The pair was still present in January 2001. The pinioned bird was last seen in December 2002. Years went by without a breeding pair in the Noorderplantsoen, a survey in spring 2005 yielded no evidence of breeding pairs in the built-up area of the city of Groningen (Nienhuis 2005).

A spontaneous settlement with three pairs took place in the Noorderplantsoen in 2009. All birds were unringed. One pair had a territory in the northern part. The nest was in a hole in the top of a high willow *Salix* sp. Eight young were hatched on 1 May, all fledged. Another pair established a territory in the southern part. The nest was in a hole in a willow. The female bred for at least six weeks in April and May, young were not recorded. The third pair nested in a tree, species unknown, in the middle part of the park. Five young were hatched on 4 May, all were Mallards *Anas platyrhynchos*. Four were soon gone, one fledged (Van Dijk 2011).

Table 1 *- Summary of details on breeding results of the main pair in 2010-2015.*

Year	Hatching date	Hatchlings	Fledglings	Fledging date[1]	Fledging period[2]
2010	17 April	11	8	2 July	76 days
2011	29 March	3	1	15 June	78 days
2012	4 March	5	5	22 May	79 days
2013	21 March[3]	1	1	-	-
id.	4 June[4]	8	8	7 Sept[5]	(95 days)
2014	26 March[3]	1	1	-	-
id.	4 June[4]	9	6-9	20 Aug	77 days
id.	5 June[6]	10	7-10	20 Aug	76 days
2015	1 April	7	7	22 June	82 days

[1] first day when both parents and (a part of) their young were not anymore present in the breeding territory.

[2] # days between hatching date and fledging date.

[3] first clutch, fledging date not applicable as the young stayed with the young of the second brood.

[4] second clutch.

[5] female started with wing moult on 4 August, all young stayed with her until she was able to fly again.

[6] young of another breeding pair, added through post-hatching brood amalgamation (see Figure 4).

The years 2010, 2011 and 2012

Only one pair established a breeding territory in the Noorderplantsoen in 2010. Both were adults and it is unknown if they were also present in 2009. They were ringed in 2010 and got large colour-rings in 2011. Their territory was in the southern part of the park annually and their breeding results in 2010-2015 are the focus of this paper. The narrative below documents the context, an overview with the breeding results is presented in Table 1.

The nest was not located in 2010. Eleven young were hatched on 17 April, one was gone by 19 April, another one by 24 April, yet another one by 25 April. The other eight fledged, five were ringed. On 2 July, 76 days after hatching, the parents and five young were recorded at Oosterpark, 2.0 km to ENE. The adults had not yet moulted when they left the territory. A few days later, the other young had left the territory. The nest was also not located in 2011. Three young were hatched on 29 March, one was gone by the next day, only one was left by 10 April. It fledged and it got colour-rings. On 15 June, 78 days after hatching, the family was located outside the park. The adults were back in December 2011 (Fig 1). Five young were hatched on 4 March 2012, the nest was in a hole in the top of a high poplar *Populus* sp. All fledged, four were colour-ringed. On 22 May, 79 days after hatching, the adults and three young were located outside the park. The others also soon left the territory. In both years, moult took place at Oostersluis, 2.7 km to the east (Fig 2). They moulted synchronously in both years. Moult started at 26 June in 2012, about three weeks earlier then in 2011.

One of the fledglings of 2010, a female, established with an unringed 2CY male a territory in the northern part of the park in 2011. Breeding was not recorded in 2011, breeding failed in 2012 (no young recorded). Her partner was colour-ringed in May 2012. The pair moved to the southern territory soon after the main pair had left this site in 2012. They moulted in the southern territory in 2012. The timing was asynchronously, the female started on 30 June, the male on 23 July. They left the territory when the male was again able to fly.

Fig 1 - The main pair in its breeding territory in the Noorderplantsoen, city of Groningen, The Netherlands, (male to the left, female to the right, 4 December 2011). © Ana Buren

A double brood in 2013

The first nest was located on 18 February 2013. It was in a hole in a broken willow on a tiny island. One young was hatched on 21 March.

Fig 2 - The main pair in wing moult at the communal moulting site at Oostersluis, city of Groningen, The Netherlands, 2.7 km east of the breeding territory (female to the left, male to the right, 26 July 2011). On 19 July 2011, both had started with moult a few days earlier. © Ana Buren

It was almost constantly brooded during a cold spell in late March. The young was only guarded by the male onwards from 1 May. The female was recorded on 6 May, she returned soon to a nest. It was at the same site as her first nest. At least eight young were hatched on the late evening of 4 June. Eight were present on 5 June, all eight fledged (five were colour-ringed). Several encounters of agonistic behaviour of the first generation young towards her siblings, including biting, were recorded in the first few days after hatching. The oldest young was a female. She was also colour-ringed and she stayed for the entire period together with the rest of the family (Fig 3). She later started on to assist with guarding her siblings. Her mother had shed most of her flight feathers on 4 August. The second generation young, 61 days old, were not yet able to fly on that day. The adult male was not present on 11 August. He had moved to Oostersluis to moult, almost all his flight feathers were shed on 17 August. All nine young stayed with the flightless female (though they could not be found on 25 August). The female and all young were still present in the territory on 7 September, all were at Oostersluis on the end of the evening of this day.

Fig 3 - The main pair (female to the left, male to the right) with a double brood, city of Groningen, The Netherlands, 23 June 2013. The young of the first clutch (middle) was hatched on 21 March, the eight young of the second clutch were hatched on 4 June. All young fledged. © Ana Buren

A double brood and brood amalgamation in 2014

The first nest was in a hole in the top of a willow in the southern tip of the territory. One young was hatched on 26 March 2014. From the end of April, only the male was guarding this young. The second nest was found on 9 May. It was 280 m north of the first nest. It was at the same site where the female had bred twice in 2013. Onwards from the beginning of May, an unringed male was regularly seen in the southern tip of the territory. He guarded an incubating female on 25 May. Her nest was at the same site where the main female had bred earlier this year. She was unringed, both were adults. Nine young of the main pair were hatched on 4 June. The first generation young once again showed agonistic behaviour towards her siblings. The unringed female was still incubating at this day.

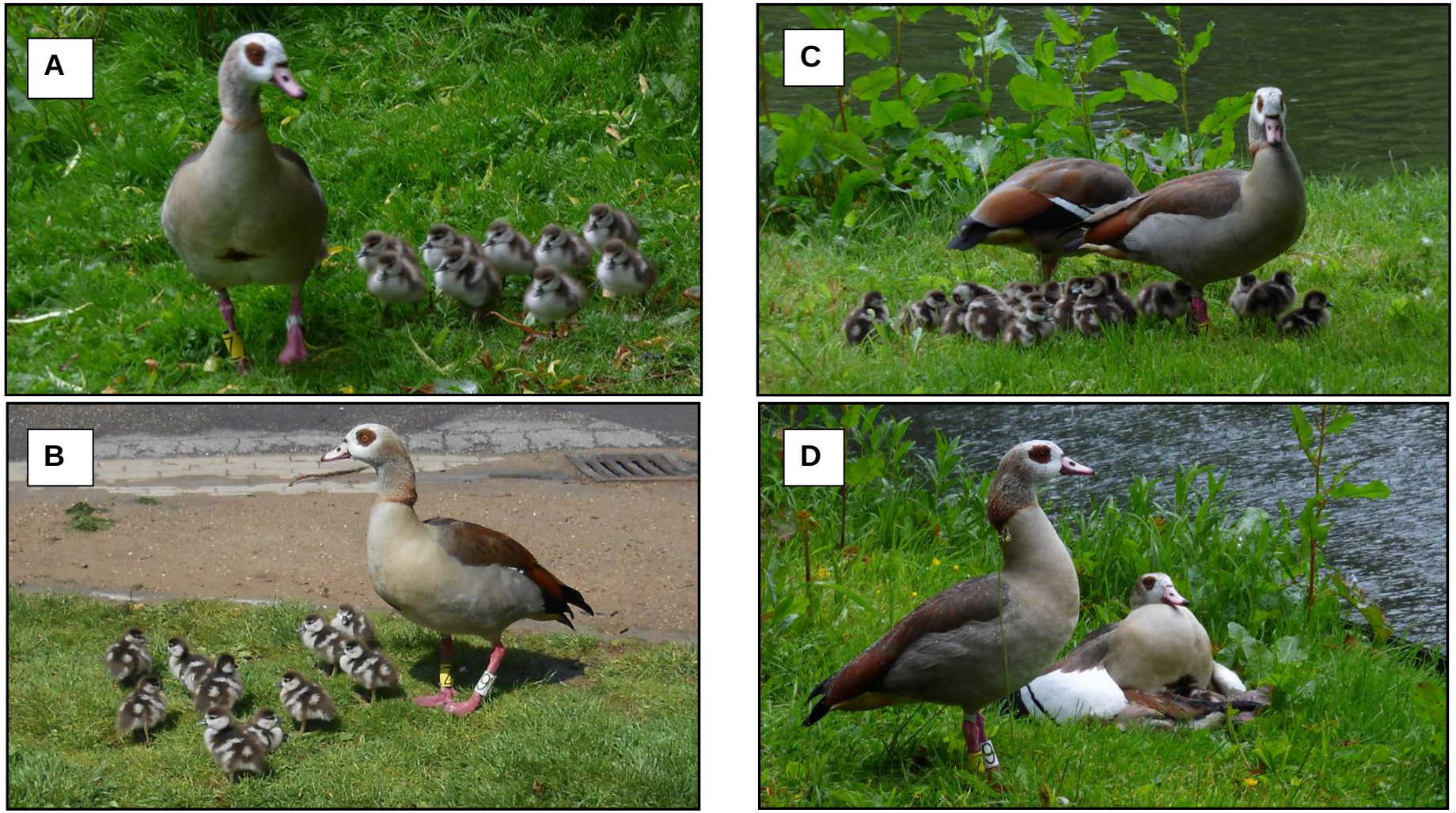

Fig 4 - Chronology of a post-hatching brood amalgamation, city of Groningen, The Netherlands, 5 June 2014. © Ana Buren (a, c, d), Klaas van Dijk (b) *A. Female with nine own young (second clutch, young were hatched on 4 June). B. Her partner with ten young of another pair. Their parents (unringed adults) gave up their young after being heavily attacked by this male earlier on this day (young were hatched the same day). Photographed about 70 m NNE of the nest of the unringed pair, the nest was about 130 m SSW of the location of the female at A. C. Male (left) and female (right) with all 19 young. Picture taken a few minutes after they re-united on the nearby water. D. Female brooding all 19 small young and partly brooding her first generation young (hatched 26 March), picture taken a few minutes later.*

On the morning of 5 June, Hilco Jansma recorded freshly hatched young at the nesting tree of the unringed pair. He also noted a heavy fight between the main male and an unringed bird at this site. I arrived just after 14:00. Ten young resided in the surroundings of this nesting tree, the main male stood nearby. The main female stayed about 120 m to the north, together with her ten young. There were no unringed adults, half an hour later the situation was unchanged. Continuous observations by HJ (captured on video) and the author started at 14:30. Not much happened for over two hours. The main female and her nine small young stayed all the time along the middle pond (Fig 4a). The main male and the alien young stayed along all the time the southern pond (Fig 4b). The first generation young walked back and forth a few times between the parents. The male more or less ignored the alien young. At 16:40, the male, followed by the alien young, crossed an intensively used cycle track situated between both ponds by foot. He then waited for about 15 minutes. He then started to walk along the shore towards his partner. The young followed him. An external disturbance forced the female and her young to enter the water. Soon afterwards the male also entered the water, together with the alien young. Both adults swam towards each other, both followed by a flock of young. All young mingled as soon as the adults met each other. We did not encounter any behaviour that the adults were aware that their brood was suddenly enlarged. The larger young was biting one of the small chicks now and then. It was also recorded that it took a small chick in its bill to shake it up for a very short while. All went out of the pond a few minutes after the unification (Fig 4c). After another few minutes the female started brooding the young (Fig 4d). Our continuous observations were terminated at 17:30. We did not record the unringed pair during this period.

There were no subsequent records of the unringed pair. All small young were still alive on 8 June, one was gone by 9 June, another one by 11 June, and yet another one by 14 June. All 16 others fledged. All the time, the adults were guarding the large flock very well (Fig 5). The first generation young was a female. It stayed and assisted with guarding all the time. All young were colour-ringed (one with only a metal ring). The main male was not present on 14 August. He was recorded at Oostersluis on the evening of that day. On 20 August, the female and the majority of the young had left the territory, 76-77 days after hatching. All young were gone by the next day. Both male and female moulted at Oostersluis, the male started first. He had shed his flight feathers on 22 August, the female started a week later.

Young of the offspring of the main pair

The 2010 daughter (see above) occupied the northern territory in 2013 and 2014, together with the same partner as in 2012. In 2013 she was recorded incubating two times, in March and in May, for at least a few weeks, young were never observed. The pair moulted at Oostersluis, moult was synchronously (score 3 on 24 August 2013). The nest in 2014 was in a hole at the top of a high poplar in the middle of the park. Seven young were hatched on 31 March, five fledged. They were raised in the northern part. A young adult was able to fly above the water on 12 June, 73 days after hatching. The next day the male had lost his flight feathers, moult of the female started five days later. The young stayed with their flightless parents. The family left the territory shortly after the parents were able to fly. On 30 April 2014, another 2010 daughter was recorded with four freshly hatched young and an adult male (unringed) in the middle part. It was unknown that she had a territory in the park. All young were gone within a few days. The bird produced a replacement clutch. On 22 July, she was recorded with five young of a few days old at Orionvijver, 0.8 km WNW. All five young fledged.

Fig 5 - The main pair with 17 young of three different broods, city of Groningen, The Netherlands, 8 August 2014. The female is guarding at the back, the male (red R / white 0, formerly white 9 / yellow Z) is guarding in front. The flock consists of one young of the first clutch, 6-9 young of the second clutch, and 7-10 young added through post-hatching brood amalgamation (see Figure 4 for details). All 17 young fledged. © Ana Buren

The parents moulted while raising their young, moult was finished before the young were able to fly. The female started with shedding her primaries on 8 August, the male started eight days later. The 2011 daughter established a breeding territory with an unringed male at Kardinge, 4.0 km ENE. She raised eight fledglings in 2013, another eight in 2014, and seven in 2015. A daughter of the second brood of 2013 established a breeding territory with an adult male (unringed) at Oliemuldervijver, 2.2 km ENE, in 2015. Six young were

hatched on 20 May, five were left by 19 June. There are as yet no records of sons of the main pair neither of sons of other pairs which have established a breeding territory in the study area.

DISCUSSION

This paper documents aspects of the breeding biology of Egyptian Geese immediately after a spontaneous settlement took place in a city park in Groningen in 2009. Many findings are preliminary due to low sample sizes. They are reported, because various aspects of the breeding biology of this species are poorly documented. The main findings will be shortly discussed.

Nests and breeding results

Nests were in holes in trees with soft wood, willow and poplar, though not all nests were located. Other pairs in the city of Groningen nested partly in trees and partly on tiny islands and in man-made duck housings at ponds (open and closed ones), nests were also on the ground in an open field and on a disused nesting platform for Stork *Ciconia ciconia* (own data). A large range of nest sites was also noted by others (Pitman 1965, Venema 1992), the serial use of a nesting site was also recorded in Zwolle, The Netherlands, where four clutches of Egyptian Geese hatched successfully in the same breeding season in a nest box designed for a Peregine Falcon *Falco peregrinus* (Van Dijk 2000).

The main pair was very successful in producing offspring. They raised in total 47 fledglings in 2010-2015 (Table 1, added young included). At least 45 young were hatched in 2010-2015, the majority (82-89%, N=37-40) fledged. Invariably, loss of young only occurred in the first two weeks after hatching, often in the first week. Records on other pairs support this pattern (own data). In Uganda loss was also concentrated in the first two weeks after hatching (Eltringham 1974). Lensink (1999) reported a more even survival during the entire fledgling period. My results and the findings of Eltringham (1974) suggest that the visiting frequency around hatching of around every 10-14 days in Lensink (1999) might have caused bias in Lensinks' data on chick survival in the early stage.

At least four fledglings of the main pair got offspring (8 fledglings in 2013, 18 in 2014). All four cases refer to females with natal philopatry. Two other cases (both in 2014, one with fledglings, one with young who were soon gone) also refer to females with natal philopatry (own data). I have reported two cases of natal dispersal earlier, both refer to males (Van Dijk and Majoor 2011). One is a male from Jever in Germany which was recorded breeding in Groningen, distance 96 km WSW. This male belonged to the study population of Menke *et al.* (2010). They reported natal philopatry for one male and for one female, I was unable to find more published information about this topic. The findings suggest sex bias in natal philopatry. I recommend that in new settlements with a ringed bird good notes are always taken of the calls of both partners.

Breeding territories and wing moult

Egyptian Geese have a fledging period of 70-75 days (Cramp and Simmons 1980) and the territory of the main pair thus became soon vacant after their young were well able to fly. Other successful pairs and pairs which lost all young soon after hatching showed the same behaviour (own data), Büssis (2004) documents a similar case for a successful pair. The method of Sutherland and Allport (1991) to assess overall breeding success in NW Europe by two visits to a territory, one in spring and one in (late) summer, may thus provide an underestimate of this parameter. Furthermore, the pond used in the (late) summer of 2014 to raise the replacement clutch of one of the fledglings of the main pair was a vacant breeding territory of a

resident pair which was moulting at Oostersluis at that time.

A vacant territory could also soon be occupied by another pair for moulting. The findings indicate a considerable variation in timing of wing moult in breeding birds and variation in the location of the moulting site of breeding birds. Breeding birds moulted in their breeding territory or at a communal moulting site, the partners moulted together or separated from each other (also recorded in another breeding pair, own data), timing of moult was not always synchronized with the fledging date of the young (also recorded in other pairs, own data), and timing between partners was variable. Very little has been published about this topic (Cramp and Simmons 1980 and Sutherland and Allport 1991 only list some general remarks). Vangeluwe and Roggeman (2000) indicate that breeding birds are unfaithful to communal moulting sites, Ndlovu *et al.* (2013) also report variation between years but don't provide details on the status of the birds. My observations don't support statements in Gerritsen (2001) that Dutch moulters are always able to fly.

Double broods

Cramp and Simmons (1980) state that Egyptian Geese only have one brood. Sutherland and Allport (1991), Lensink (1999), Gyimesi and Lensink (2012) and various papers and notes in regional ornithological journals do not list details on double broods. Eltringham (1974) indicates that some pairs in his study area might have nested twice in a year. This information is also listed in Lensink (1999). The records in Eltringham (1974) refer to observations throughout the year of unmarked pairs rearing young in fixed territories bordering each other. These territories were only used for rearing young and it is thus not excluded that they were used in serie by different pairs for rearing young (see also above). Andris *et al.* (2011) present comparable records, once again sightings of unmarked birds. The observations in my paper refer to ringed birds. The same is the case for a recent record in Jever in Germany (Menke *et al.* 2010) and for three other records in The Netherlands, one in Amsterdam (Slotervaart, June 2013, Willem van der Waal), one in Arnhem (Table 2, Figure 6) and another one in Groningen in 2015 (own data).

The well-documented case in Arnhem clearly demonstrates that a female can produce a double brood in several years, and that second broods can occur after first broods with a variable number of fledglings. Records of double broods in Barnacle Geese *Branta leucopsis* in the UK (West *et al.* 1986) refer to a semi-captive population in a fenced area which got supplementary food, all cases in my paper refer to spontaneous settlements (though the general public in city parks often offers bread to the Egyptian Geese and to other waterbirds).

The five cases underline that the phenomenon of a double brood in Egyptian Geese occurs at more places in Europe. Several studies report pairs with small young in (late) summer in NW Europe (Jonker and Ruitenbeek 1998, Lensink 1999, Andris *et al.* 2011, own data), sometimes classified as a second peak of pairs with young. The five cases indicate that these records in (late) summer may partly refer to pairs with a double brood, in line with ideas in Eltringham (1974) and in Andris *et al.* (2011). Furthermore, Cramp and Simmons (1980) mention that no information exists on the occurrence of replacement clutches. My data are supplemented by records of other marked females (own data, see also Table 2), Menke *et al.* (2010) also list some records. More field records are needed, (1) to clarify if double broods only occur in the European population (see Berg and Lerner 2014 for a recent case in Sweden of a double brood in Canada Goose *Branta canadensis*), (2) to clarify if double broods only occur

Table 2 *- Breeding results of a male Egyptian Goose (Arnhem 8043104, white H / yellow 3) in Musis Sacrum, a city park in Arnhem, The Netherlands, in 2001-2013. This male was ringed as adult in the breeding territory on 10 March 2001. He was found dead (freshly dead) in the breeding territory on 22 March 2013 (death likely caused by territorial fights). He raised a total of 125 fledglings in all these years. Source: database of Frank Majoor.*

This male was first paired with female 1 (Arnhem 8025976, ringed in Musis Sacrum as adult on 2 November 2000). Onwards from December 2001 he was paired with female 2 (Arnhem 8025966, ringed as young elsewhere in Arnhem in May 2000), onwards from November 2007 he was paired with female 3 (Arnhem 8017436, white C / yellow 5, ringed as young elsewhere in Arnhem in June 2005, depicted in Figure 6).

Year	F	First brood			Second brood			Third brood		
		First day with young[1]	Hatchlings	Fledglings	First day with young[1]	Hatchlings	Fledglings	First day with young[1]	Hatchlings	Fledglings
2001	1	24 Mar	8	7	-	-	-	-	-	-
2002	2	26 Mar	9	9	-	-	-	-	-	-
2003	2	22 Feb	8	8	-	-	-	-	-	-
2004	2	14 Feb	11	9	9 Dec	8	1	-	-	-
2005	2	3 May	10	10	-	-	-	-	-	-
2006	2	5 Mar[2]	>2	2	12 Sep[2]	8	8	-	-	-
2007	2	12 Feb[2]	10	10	-	-	-	-	-	-
2008	3	18 Feb[2]	6	4	22 Jul[2]	4	4	-	-	-
2009	3	2 Jan	9	0	30 Mar	3	3	1 Jun	9	9
2010	3	26 Apr[3]	10	10	15 Nov	11	2	-	-	-
2011	3	12 May[4]	10	9	2 Nov	8	4	-	-	-
2012	3	23 Feb	3	0	19 Apr	7	7	24 Jun	9	7
2013	3	19 Feb	4	0	24 Apr	7	2	-	-	-

[1] young hatched one or a few days earlier (unless indicated otherwise).
[2] age of young unknown.
[3] age of young ca. one week.
[4] replacement clutch after the first breeding attempt failed (incubating from 15 February - 17 March, failed 21 March).

in the urban habitat, and (3) to assess the frequency of replacement clutches in Egypian Goose.

Brood amalgamation

Brood amalgamation before or after hatching, also defined as adoption, brood parasitism or crèche formation, is a quite common strategy in a large variety of species of ducks and geese (Eadie *et al.* 1988, Beauchamp 1997). It is often hard to know for sure how and under which circumstances the amalgamation in a non-experimental situation took place, and it is also not always possible to follow the whole family until all young are fledged. It was very fortunate that the initial phase could be fully documented and that all birds could be followed until all young fledged.

Fig 6 – Breeding pair of Egyptian Geese with a double brood in a city park in Arnhem, The Netherlands, 4 June 2009. © Koos Dansen
Three young of the first generation (in the front) were seen for the first time on 30 March (hatched one or a few days earlier, all three fledged), nine young of the second generation (in the back) were seen for the first time on 1 June (hatched one or a few days earlier, all nine fledged). Source: database of Frank Majoor (see Table 2 for details).

Once again, very little about post-hatching brood amalgamation in Egyptian Goose can be found in the literature. Beauchamp (1997) states in his extensive review that both pre-hatching and post-hatching brood amalgamation do not occur. Cramp and Simmons (1980) don't provide details. Other sources indicate that post-hatching brood amalgamation might occur occasionally. A note and a letter in British Birds (Bloomfield 2001, Sage 2001) document probable cases in England in the 1990s of pairs with young of about the same age (records based on (almost) daily visits). Other indications include records of pairs with young of an unequal age in Eltringham (1974) and an observation in Amsterdam-Noord in July 2014 of a pair with four young of about four weeks and one young of about three weeks (Willem van der Waal). The record in Groningen is, to the best of my knowledge, the first time that the actual moment

of a post-hatching brood amalgamation in this species was fully documented.

Many researchers have posed ideas about costs and benefits of brood amalgamation in ducks and geese, from the viewpoint of the parents of both sides and from the viewpoint of the young of both sides. Much remains hitherto unknown (see Kalmbach 2006 and Lyon and Eadie 2008 for recent reviews). Kampp and Preuss (2005) conducted extensive calculations on long term data of a ringed breeding population of Greylag Geese *Anser anser* in Copenhagen in Denmark, but were unable to draw solid conclusions about cost and benefits. Lack on details on a genetic relationship between donor and recipient (though my paper presents indications for a strong natal philopatry among females) and lack on details on the breeding experience of the donor pair (though the recipient can be qualified as experienced) are reasons why providing a good explanation for this case is as yet not possible.

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REFERENCES

Andris K, Gabler E, Hurst J, Münch C, Rupp J, Westermann K 2011. Rasche Ausbreitung der Nilgans am südlichen Oberrhein. Naturschutz am südlichen Oberrhein 6: 85-98. (In German, with English summary)

Beauchamp G 1997. Determinants of intraspecific brood amalgamation in waterfowl. Auk 114: 11-21.

Berg C, Lerner H 2014. A second brood in Canada Geese? Ornis Svecica 24: 51-55.

Bloomfield A 2001. Large brood size and crèche formation of Egyptian Geese. British Birds 94: 88.

Büssis H 2004. Bruterfolg baumbrütender Nilgänse in Fuestrup, Stadt Greven. Natur und Heimat 64: 85-93. (In German)

Cramp S, Simmons K 1980. The birds of the Western Palearctic 1 (reprint). Oxford University Press, Oxford.

Eadie J, Kehoe F, Nudds T 1988. Pre-hatch and post-hatch brood amalgamation in North American Anatidae: a review of hypotheses. Canadian Journal of Zoology 66: 1709-1721.

Eltringham S 1974. The survival of broods of the Egyptian Goose in Uganda. Wildfowl 25: 41-48.

Gerritsen G 2001. Zomerconcentraties van ruim 1000 Nijlganzen in Zwolle. Limosa 74: 27-28. (In Dutch, with English summary)

Ginn H, Melville D 1983. Moult in birds. BTO Guide 19. BTO, Tring.

Gyimesi A, Lensink R 2012. Egyptian Goose: an introduced species spreading in and from The Netherlands. Wildfowl 62: 126-143.

Jonker K, Ruitenbeek W 1998. Eerste resultaten van het nijlganzenonderzoek. Graspieper 18: 146-151. (In Dutch)

Kalmbach E 2006. Why do goose parents adopt unrelated goslings? A review of hypotheses and empirical evidence, and new research questions. Ibis 148: 66-78.

Kampp K, Preuss N 2005. The Greylag Geese of Utterslev Mose. Dansk Ornitologisk Forenings Tidsskrift 99: 1-78.

Lensink R 1999. Aspects of the biology of Egyptian Goose colonizing The Netherlands. Bird Study 46: 195-204.

Little R, Vester K, Crowe T 1995. Temporal and spatial breeding activity of 12 duck species in the Cape Provinces, South Africa, and their implications for hunting seasons. South African Journal of Wildlife Research 25: 17-22.

Lyon B, Eadie J 2008. Conspecific brood parasitism in birds: a life-history perspective. Annual Review of Ecology, Evolution, and Systematics 39: 343-363.

Maclean G 1997. Egyptian Goose. In: Harrison J, *et al.* (eds). The Atlas of Southern African Birds 1. BirdLife South Africa, Johannesburg: 122-123.

Menke W, Geiter O, Homma S 2010. Nilgänse in Jever: das Ansiedeln von „Ziergeflügel“ an den Graften und die Folgen. Jahresbericht Ornithologische Arbeitsgemeinschaft Oldenburg 20: 85-97. (In German)

Ndlovu M, Cumming G, Hockey P, Nkosi M, Mutumi G 2013. A study of moult-site fidelity in Egyptian Geese in South Africa. African Zoology 48: 240-249.

Nienhuis J 2005. Verspreiding en aantalontwikkeling van Nijlganzen in Noord-Drenthe en Midden-Groningen. Drentse Vogels 19: 12-18. (In Dutch, with English summary)

Pitman C 1965. The nesting and some other habits of *Alopochen*, *Nettapus*, *Plectropterus* and *Sarkidiornis*. Wildfowl 16: 115-121.

Sage B 2001. Large brood size and crèche formation of Egyptian Geese. British Birds 94: 331.

Scott D, Rose P 1996. Atlas of *Anatidae* populations in Africa and Western Eurasia. Wetlands International, Wageningen.

Sutherland W, Allport G 1991. The distribution and ecology of naturalized Egyptian Geese in Britain. Bird Study 38: 128-134.

Triplet P, Trolliet B, Yèsou P, Tréca B 1993. On the laying period of the Egyptian Goose in the delta of the River Senegal. Malimbus 15: 94-95.

van Dijk J 2000. Hoe groot is de invloed van Nijlganzen op het broedsucces van roofvogels? Takkeling 8: 218-220. (In Dutch, with English summary)

van Dijk K 2011. Een geval van adoptie van kuikens van Wilde Eend door Nijlgans. Grauwe Gors 39: 70-73. (In Dutch)

van Dijk K, Majoor F 2011. Geboortedispersie van Nijlganzen van Nederland naar Duitsland en vice versa. Limosa 84: 82-84. (In Dutch, with English summary)

Vangeluwe D, Roggeman W 2000. Evolution, structure et gestion des rassemblements d'Ouettes d'Égypte férales en région Bruxelles-Capitale. Report. IRSNB, Brussels. (In French)

Venema P 1992. De Nijlgans in Drenthe in 1980-91. Drentse Vogels 5: 3-11. (In Dutch, with English summary)

West J, Black J, Nugent M, Owen M 1986. Second-brooding in semi-captive Barnacle Geese. Wildfowl 37: 51-54.

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