Chapter 1

General introduction

ABC-book from the 1950s indicating that the skylark was a common bird in those days

Intensification of arable farming and the decline of farmland birds

During the past decades agricultural yields have increased enormously in north-western Europe (e.g. Chamberlain *et al.*, 2000). In order to reach these high yields European agriculture has intensified drastically. The process of agricultural intensification is characterized farm specialization, increased field size, removal of semi-natural habitats and increased inputs of agrochemicals (artificial fertilizers and pesticides). Mixed farms have been replaced by farms which focus on only one type of agriculture, such as arable or dairy. Moreover, arable farmers grow less different crop types and less varieties of certain crop types, and together with removal of semi-natural habitats this has resulted in larger monocultures (e.g. Stoate *et al.*, 2001; Robinson and Sutherland, 2002). The use of agro-chemicals has been expanded from the 1970s onwards. Larger areas are sprayed with pesticides and per area unit more fertilizers are applied (Chamberlain *et al.*, 2000; Stoate *et al.*, 2001).

As a consequence of processes linked to agricultural intensification, landscape quality, in terms of landscape diversity and areas of semi-natural habitats of modern farmland, has declined (Stoate *et al.*, 2001; Robinson and Sutherland, 2002). In the Netherlands currently, farm area covered with semi-natural habitats is only about 2-3% (Manhoudt and de Snoo, 2003). Semi-natural habitats like field margins and hedgerows are of large importance for plants, invertebrates, birds and mammals in agricultural habitats. As a result of this development agricultural landscapes offer less suitable habitat for many species.

Besides negative effects on landscape quality, agricultural intensification has also resulted in reductions of populations of a wide range of taxonomic groups. Herbicide use, increased inputs of fertilizers and increased tillage frequency have had negative effects on wild plants (Robinson and Sutherland, 2002; Baessler and Klotz, 2006). Increased usage of insecticides is one of the main causes behind declines of invertebrate populations (Benton *et al.*, 2002; Robinson and Sutherland, 2002; Schweiger *et al.*, 2005). Reduction of available plant material and invertebrates has resulted in the fact that species higher in the food chain, such as birds, have become more and more under pressure as well (Siriwardena *et al.*, 1998; Donald *et al.*, 2001; Wretenberg *et al.*, 2006).

Population declines of farmland birds have strongly raised the attention of conservationists and ecologist. Consequently, relations between agricultural intensification and farmland birds have been studied intensively (e.g. Chamberlain *et al.*, 2000; Donald *et al.*, 2001, 2006, Wretenberg *et al.*, 2006). Populations of several species show severe declines and currently species like skylark *Alauda arvensis*, linnet *Carduelis cannabina* and grey partridge *Perdix perdix* have been placed on Red Lists in several countries (Gregrory *et al.*, 2002; van Beusekom *et al.*, 2004; Gärdenfors, 2005). As an illustration table 1 shows the trends of characteristic bird species of arable land in the Netherlands, UK and Sweden, as well as their conservation status.

Several changes in current agricultural practice have initiated these population declines. During the breeding season, availability of suitable nest sites and food are limited in modern agricultural landscapes. First of all, the reduction of crop diversity has limited multi-brooded ground-breeding species (e.g. skylark, yellow wagtail *Motacilla flava*) to produce multiple broods. These species probably need more than one successful brood per breeding season in order to self sustain the breeding population (Wilson *et al.*, 1997). Secondly, the shift from spring sown cereals to autumn sown cereals which took place especially in the UK (e.g Chamberlain *et al.*, 2000) has reduced the availability of suitable breeding habitat for species like skylark (Wilson *et al.*, 1997; Chamberlain *et al.*, 1999a). Thirdly, removal of semi-natural habitats like hedgerows has reduced the availability of suitable breeding sites for species like linnet and yellowhammer *Emberiza citrinella.* Fourthly, evidence has been found that increased usage of insecticides has resulted in reduced food (invertebrate) availability and consequently a reduction in reproductive success (Potts, 1986; Hart *et al.*, 2006).

Besides problems during the breeding season, also winter habitat has been degraded. The switch from spring sown cereals to autumn sown cereals have reduced the availability of stubble fields, which are important foraging habitats for wintering granivorous farmland passerines (e.g Hancock and Wilson, 2003; Gillings *et al.*, 2005; Orlowski, 2006; Perkins *et al.*, 2008). The use of more efficient harvesting methods has reduced the amount of cereal grains left on the fields during winter. Furthermore, increased usage of herbicides has limited weed seed production. These factors have probably contributed to reduced winter survival rates of farmland birds and consequently population declines (Peach *et al.*, 1999; Siriwardena *et al.*, 2008).

In order to reverse the declines of farmland bird populations, roughly two approaches could be adopted: (1) agri-environment schemes and (2) organic farming. Agri-environment schemes are based on the principle that some area of the agricultural land is managed less intensively in order to provide suitable habitat for certain species or taxonomic groups. The remaining area can still be managed very intensively. Examples of agri-environment schemes are uncropped field margins and set-aside land. In contrast with agri-environment schemes, organic farming aims at sustaining healthy ecosystems. IFOAM, the worldwide organization for organic farming, uses the following definition for organic farming:

"Organic farming is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the

shared environment and promote fair relationships and a good quality of life for all involved."

As a result of this system-broad conversion it a wide spectrum of species and taxonomic groups benefits from this (Hole *et al.*, 2005).

Table 1 Population trends and presence on Red Lists of bird species characteristic to arable farmland. Population trends are expressed as % of population change, NDA = no data available. NL = the Netherlands, UK – United Kingdom, SW = Sweden. Sources: Gregrory *et al.*, 2002; van Beusekom *et al.*, 2004; Gärdenfors, 2005.

	Population trend			Present on Red List		
Species	NL (1973-2000)	UK (1970-2001)	SW (1976-2001)	NL	UK	SW
Grey Partridge	-73	-86	NDA	X	X	X
Skylark	-90	-54	-55	X	X	X
Tree Sparrow	-84	-94	-25	X	X	
Linnet	-53	-51	-53	X	X	X
Yellowhammer	0	-52	-40		X	
Corn Bunting	-94	-89	NDA	X	X	X
Reed Bunting	+55	-48	-1.8[1]		X	
Yellow Wagtail	-18	-59	-3.9[1]	X		
Meadow Pipit	-25	-31	-1.4[1]	X		
Lapwing	+5	-41	-32			
Turtle Dove	-74	-77	Not breeding	X	X	NA
Barn Swallow	0	+11	-3	X		

[1] = Mean population change per year

Managing birds on arable farmland

Agri-environment schemes

In arable areas, one of the most common initiatives is the installation of uncropped field margins. In general, these margins are approximately 3-10 m wide, with a grass or herbaceous vegetation. Aim of these margins is often to safeguard habitats for plants, invertebrates and birds. Some evidence has been found that uncropped field margins can be an effective measure for flora protection in agricultural habitats (Kiss *et al.*, 1997). In addition to this, several studies have pointed out the importance of uncropped field margins for different invertebrate groups (e.g. Dennis and Fry, 1992; Kromp and Steinberger, 1992). Also for birds positive effects of field margins have been recorded. Field margins can have different functions for birds, such as foraging sites (Perkins *et al.*, 2002) and breeding sites.

A second widespread agri-environment scheme is set-aside. Originally, the EU installed the set-aside regulation in the early 1990s in order to counteract overproduction of cereals. As a result of this regulation farmers were obliged to take some of their land out of production in order to counteract the overproduction. Side-effect of this regulation was a positive effect on farmland bird numbers. Soon it was clear that set-aside fields attracted high numbers of bird during the breeding season and during winter (Berg and Pärt, 1994; Buckingham *et al.*, 1999; Henderson *et al.*, 2000). In the Netherlands Montagu's harrier *Circus pygargus* numbers increased as a result of the introduction of set-aside fields which resulted in high numbers of voles (Koks *et al.*, 2007).

Although some studies have proven that agri-environment schemes can enhance farmland bird populations (e.g. Peach *et al.*, 2001), the effectiveness of agri-environment schemes has been under debate (e.g. Kleijn *et al.*, 2001; Kleijn and Sutherland, 2003; Kleijn and van Zuylen, 2004). Besides this, agri-environment schemes are financed with government money and thus vulnerable for changes in the political field. This means that there is no guarantee for subsidies and thus for sustainable management of farmland birds.

Organic farming for farmland birds

Organic arable farms and 'landscape lay-out': crop rotation and semi-natural habitats

Organic arable farmers generally grow more different crop types than conventional farmers (McCann *et al.*, 1997; Levin, 2007). This is mainly done to reduce the risk of outbreaks of crop damaging fungi and soil active invertebrates (e.g. Nematoda). More different crop types provide more different habitats and that might result in higher avian diversity. Besides that, higher crop diversity on organic farms might provide multi-brooded species with more suitable nesting sites throughout the entire breeding season. Besides more different crop types, organic farmers grow often spring sown cereals in stead of autumn sown cereals (Bengtsson *et al.*, 2005; Hole *et al.*, 2005). Growing mainly spring sown crop probably enhances food accessibility for ground feeding birds as swards are less dense during the breeding season. Furthermore, it is probably more suitable as nesting site for ground-breeding species, such as lapwing and skylark.

Several studies showed that organic farms have more semi-natural habitat (i.e. habitats not used for production purposes) compared to conventional counterparts (van Mansvelt *et al.*, 1998; Fuller *et al.*, 2005; Gibson *et al.*, 2007; Levin, 2007). Additionally, semi-natural habitats on organic farms are found to have larger dimensions as well (Chamberlain *et al.*, 1999b; Fuller *et al.*, 2005; Gibson *et al.*, 2007). As semi-natural habitats probably need a certain minimum size in order to attract birds (Sparks *et al.*, 1996; Marshall *et al.*, 2006) the effects on bird densities might be stronger when they are larger, wider or taller.

Organic arable farms and crop management: pesticides and fertilizers

In organic agriculture the use of artificial pesticides is prohibited (SKAL, 2008). In stead, organic farmers apply “natural” methods to control insect pests and weeds. Among other ways, insect pests are controlled by enhancing populations of natural enemies (e.g. Staphylinidae, Parasitica). Weeds are mainly controlled mechanically, by harrowing and hoeing. Although the prohibition of artificial agrochemicals is likely to result in higher food abundance (invertebrates and plant material) for birds, mechanical weeding might be a potential threat to especially ground-breeding birds (e.g. skylark, yellow wagtail, lapwing).

Instead of artificial fertilizers, organic farmers apply organic manure and sow nitrogen binding crops after harvesting. As a result, soil organic matter probably increases, stimulating soil life. Consequently, a richer soil life probably also stimulate above ground invertebrates (Smeding and de Snoo, 2003), which form an important part of the diet of many farmland birds (Holland *et al.*, 2006).

Objectives

There are several previous studies that compared breeding bird densities between organic and conventional farms (Christensen *et al.*, 1996; Wilson *et al.*, 1997; Chamberlain *et al.*, 1999b; Freemark and Kirk, 2001; Beecher *et al.*, 2002; Lubbe and de Snoo, 2007). Most of these studies concluded positive effects of organic farming on breeding bird densities, but the reasons behind these differences are not clear yet.

However, territory establishment is only one part of the story. Differences in crop management and crop partition are likely to affect breeding success. This information is of crucial importance in order to conclude whether organic farming does not only hold higher densities of bird, but also enhances farmland bird populations. The objective of this dissertation is to compare organic and conventional arable farms as breeding habitat for farmland birds. Therefore, territory densities, breeding success and food abundance will be compared between organic and conventional arable farms. Differences will be explained by investigating the effects differences in farm lay-out (crops and non-crop habitats), crop management and food abundance (for territory densities and breeding success).

In pursuit of this goal, a series of studies was carried out with the following objectives: (1) assessing and explaining differences in breeding bird densities between organic and conventional arable farms, (2) assessing and explaining differences in breeding success of birds between organic and conventional farms, (3) assessing the effectiveness of volunteer nest protection on reproductive success on both farm types, (4) assessing chick food availability on organic and conventional arable farms. Differences in breeding bird densities were explained by looking at three different factors: (1) abundance of non-cropped habitats, (2) crop partition, and (3) within-crop factors. The latter includes sward structure and food abundance. Concerning reproductive success, direct effects of farm management on nest survival were investigated. Additionally, the possibility of indirect effects of differences in food resources on breeding success was assessed as well.

Thesis structure

Differences in breeding bird densities

Chapter 2: In this chapter territory densities of ground-breeding birds were compared between organic and conventional arable farms for a selection of farmland bird species. Additionally, it was analysed why the abundance of certain species differed between the two farming systems and why this was not the case for other species.

Chapter 3: This chapter describes differences in abundance of breeding barn swallows (*Hirundo rustica*) on organic and conventional arable farms. Besides this, farmers' attitude towards presence of Barn Swallows was compared as well.

Differences in breeding success

Chapter 4: This chapter focuses on the nest success of lapwings (*Vanellus vanelus*) on organic and conventional farms. Differences in nest success between the two farming systems were analysed and explained by investigating three causes of nest failure: (1) farming operations, (2) predation, and (3) nest desertion.

Chapter 5: This chapter focuses on the breeding activity and breeding success of skylarks (*Alauda arvensis*) on organic and conventional arable farms. The effects of crop partition on breeding activity and crop management on breeding success are evaluated.

Chapter 6: In this chapter it was analysed whether volunteer nest protection of lapwings could be a possibility to enhance populations of ground-breeding farmland bird. Therefore, a case study was carried out comparing the nest success of lapwings on organic and conventional arable farms with and without nest protection.

Differences in food abundance

Chapter 7: In this chapter bird chick food availability is compared between organic and conventional farms.

Chapter 8: General discussion

References

Baessler, C., Klotz, S., 2006. Effects of changes in agricultural land-use on landscape structure and arable weed vegetation over the last 50 years. Agriculture, Ecosystems and Environment 115: 43-50.

Beecher, N.A., Johnson, R.J., Brandle, J.R., Case, R.M., Young, L.J., 2002. Agroecology of birds in organic and nonorganic farmland. Conservation Biology 16: 1620-1631.

Bengtsson, J., Ahnström, J., Weibull, A., 2005. The effects of organic agriculture on biodiversity and abundance: a meta-analysis. Journal of Applied Ecology 42: 261-269.

Benton, T.G., Bryant, D.M., Cole, L., Crick, H.Q.P., 2002. Linking agricultural practice to insect and bird populations: a historical study over three decades. Journal of Applied Ecology 39: 673-687.

Berg, Å., Pärt, T., 1994. Abundance of breeding farmland birds on arable and set-aside fields at forest edges. Ecography 17: 147-152.

Buckingham, D.L., Evans, A.D., Morris, A.J., Orsman, C.J., Yaxley, R., 1999. Use of set-aside land in winter by declining farmland bird species in the UK. Bird Study 46: 157-169.

Chamberlain, D.E., Wilson, A.M., Browne, S.J., Vickery, J.A., 1999a. Effects of habitat management and the abundance of skylarks in the breeding season. Journal of Applied Ecology 36: 856-870.

Chamberlain, D.E., Wilson, J.D., Fuller, R.J., 1999b. A comparison of bird populations on organic and conventional farm systems in southern Britain. Biological Conservation 88: 307-320.

Chamberlain, D.E., Fuller, R.J., Bunce, R.G.H., Duckworth, J.C., Shrubb, M., 2000. Changes in the abundance of farmland birds in relation to the timing of agricultural intensification in England and Wales. Journal of Applied Ecology 37: 771-788.

Christensen, K.D., Jacobsen, E.M., Nøhr, H., 1996. A comparative study of bird faunas in conventionally and organically farmed areas. Dansk Ornitologisk Forenings Tidsskrift 90: 21-28.

Dennis, P., Fry, G.L.A., 1992. Field margins: Can they enhance natural enemy populations and general arthropod diversity on farmland? Agriculture, Ecosystems and Environment 40: 95-115.

Donald, P.F., Green, R.E., Heath, M.F., 2001. Agricultural intensification and the collapse of Europe's farmland bird populations. Proceedings of the Royal Society London, B 268: 25-29.

Donald, P.F., Sanderson, F.J., Burfield, I.J., van Bommel, F.P.J., 2006. Further evidence of continent-wide impacts of agricultural intensification on European farmland birds, 1990-2000. Agriculture, Ecosystems and Environment 116: 189-196.

Freemark, K.E., Kirk, D.A., 2001. Birds on organic and conventional farms in Ontario: partitioning effects of habitat and practices on species composition and abundance. Biological Conservation 101: 337-350.

Fuller, R.J., Norton, L.R., Feber, R.E., Johnson, P.J., Chamberlain, D.E., Joys, A.C., Mathews, F., Stuart, R.C., Townsend, M.C., Manley, W.J., Wolfe, M.S., Macdonald, D.W., Firbank, L.G., 2005. Benefits of organic farming to biodiversity vary among taxa. Biology Letters 1: 431-434.

Gärdenfors, U., 2005. Rödlistade arter I Sveverige 2005 – The 2005 Red List of Swedish Species. ArtDatabanken, SLU I samarbete med Naturvåardsverket, Uppsala.

Gibson, R.H., Pearce, S., Morris, R.J., Symondson, W.O., 2007. Plant diversity and land use under organic and conventional agriculture: a whole-farm approach. Journal of Applied Ecology 44: 792-803.

Gillings, S., Newson, S.E., Noble, D.G., Vickery, J.A., 2005. Winter availability of cereal stubbles attracts declining farmland birds and positively influences breeding population trends. Proceedings of the Royal Society B 272: 733-739.

Gregory, R.D., Wilkinson, N.I., Noble, D.G., Brown, A.F., Robinson, J.A., Hughes, J., Procter, D.A., Gibbons, D.W., Galbraith, C.A., 2002. The population status of birds in the United Kindom, Channel Islands and Isle of Man: an analysis of conservation concern 2002-07. British Birds 95: 410-448.

Hancock, M.H., Wilson, J.D., 2003. Winter habitat associations of seed-eating passerines on Scottish farmland. Bird Study 50: 116-130.

Hart, J.D., Milsom, T.P., Fisher, G., Wilkins, V., Moreby, S.J., Murray, A.W.A., Robertson, P.A., 2006. The relationship between yellowhammer breeding performance, arthropod abundance and insecticide applications on arable farmland. Journal of Applied Ecology 43, 81-91.

Henderson, I.G., Cooper, J., Fuller, R.J., Vickery, J.A., 2000. The relative abundance of birds on set-aside and neighbouring fields in summer. Journal of Applied Ecology 37: 335-347.

Hole, D.G., Perkins, A.J., Wilson, J.D., Alexander, I.H., Grice, P.V., Evans, A.D., 2005. Does organic farming benefit biodiversity? Biological Conservation 122: 113-130.

Holland, J.M., Hutchison, M.A.S., Smith, B., Aebischer, N.J., 2006. A review of invertebrates and seed-bearing plants as food for farmland birds in Europe. Annals of Applied Biology 148: 49-71.

Kiss, J., Penksza, K., Tóth, F., Kádár, F., 1997. Evaluation of fields and field margins in nature production capacity with special regard to plant protection. Agriculture Ecosystems and Environment 63: 227-232.

Kleijn, D., Berendse, F., Smit, R., Gilissen, N., 2001. Agri-environment schemes do not effectively protect biodiversity in Dutch agricultural landscapes. Nature 413: 723-725.

Kleijn, D., Sutherland, W.J., 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity? Journal of Applied Ecology 40: 947-969.

Kleijn, D., van Zuijlen, G.J.C., 2004. The conservation effects of meadow bird agreements on farmland in Zeeland, The Netherlands, in the period 1989–1995. Biological Conservation 117: 443-451.

Koks, B.J., Trierweiler, C., Visser, E.G., Dijkstra, C., Komdeur, J., 2007. Do voles make agricultural habitat attractive to Montagu's Harrier *Circus pygargus*? Ibis 149: 575-586.

Kromp, B., Steinbeger, K.H., 1992. Grassy field margins and arthropod diversity: a case study on ground beetles and spiders in eastern Austria (Coleoptera: Carabidae; Arachnidae: Aranei, Opiliones). Agriculture, Ecosystems and Environment 40: 71-93.

Levin, G., 2007. Relationships between Danish organic farming and landscape composition. Agriculture, Ecosystems and Environment 120: 330-344.

Lubbe, S.K., de Snoo, G.R., 2007. Effect of dairy farm management on Swallow *Hirundo rustica* abundance in The Netherlands. Bird Study 54: 176-181.

Manhoudt, A.G.E., de Snoo, G.R., 2003. A quantitative survey of semi-natural habitats on Dutch arable farms. Agriculture Ecosystems and Environment 97: 235-240.

Marshall, E.J.P., West, T.M., Kleijn, D., 2006. Impacts of an agri-environment field margin prescription on the flora and fauna of arable farmland in different landscapes. Agriculture, Ecosystems and Environment 113: 36-44.

McCann, E., Sullivan, S., Erickson, D, De Young, R., 1997. Environmental awareness, economic orientation, and farming practices: a comparison of organic and conventional farmers. Environmental Management 21: 747-758.

Orlowski, G., 2006. Cropland use by birds wintering in arable landscape in south-western Poland. Agriculture, Ecosystems and Environment 116: 273-279.

Peach, W.J., Siriwardena, G.M., Gregory, R.D., 1999. Long-term changes in over-winter survival rates explain the decline of reed buntings *Emberiza schoeniclus* in Britain. Journal of Applied Ecology 36: 798-811.

Peach, W.J., Lovett, L.J., Wotton, S.R, Jeffs, C., 2001. Countryside stewardship delivers cirl buntings (*Emberiza cirlus*) in Devon, UK. Biological Conservation 101: 361-373.

Perkins, A.J., Whittingham, M.J., Morris, A.J., Bradbury, R.B., 2002. Use of field margins by foraging yellowhammers *Emberiza citrinella*. Agriculture, Ecosystems and Environment 93: 413-420.

Perkins, A.J., Maggs, H.E. & Wilson, J.D., 2008. Winter bird use of seed-rich habitats in agri-environment schemes. Agriculture, Ecosystems and Environment 126: 189-194.

Potts, G.R., 1986. The Partridge: Pesticides, Predation and Conservation. Harper Collins, London.

Robinson, R.A., Sutherland, W.J., 2002. Post-war changes in arable farming and biodiversity in Great Britain. Journal of Applied Ecology 39: 157-176.

Schweiger, O., Maelfait, J.P., van Wingerden, W., Hendrickx, F., Billeter, R., Speelmans, M., Augenstein, I., Aukema, B., Aviron, S., Bailey, D., Bukacek, R., Burel, F., Diekötter, T., Dirksen, J., Frenzel, M., Herzog, F., Liira, M., Roubalova, M., Bugter, R., 2005. Quantifying the impact of environmental factors on arthropod communities in agricultural landscapes across organizational levels and spatial scales. Journal of Applied Ecology 42: 1129-1139.

Siriwardena, G.M., Baillie, S.R., Buckland, S.T., Fewster, R.M., Marchant, J.H., Wilson, J.D., 1998. Trends in the abundance of farmland birds: a quantitative comparison of smoothed Common Birds Census indices. Journal of Applied Ecology 35: 24-43.

Siriwardena, G.M., Calbrade, N.A., Vickery, J.A., 2008. Farmland birds and late winter food: does seed supply fail to meet demand? Ibis 150: 585-595.

SKAL, 2008. www.skal.nl

Smeding, F.W., de Snoo, G.R., 2003. A concept of food-web structure in organic arable farming systems. Landscape and Urban Planning 65: 219-236.

Sparks, T.H., Parish, T., Hinsley, S.A., 1996. Breeding birds in field boundaries in an agricultural landscape. Agriculture, Ecosystems and Environment 60: 1-8.

Stoate, C., Boatman, N.D., Borralho, R.J., Rio Carvalho, C, de Snoo, G.R., Eden, P., 2001. Ecological impacts of arable intensification in Europe. Journal of Environmental Management 63: 337-365.

van Beusekom, R., Huigen, P., Hustings, F., de Pater, K., Thissen, J., 2004. Rode Lijst van de Nederlandse broedvogels. Tirion Uitgevers B.V., Baarn.

van Mansvelt, J.D., Stobbelaar, D.J., Hendriks, K., 1998. Comparison of landscape features in organic and conventional farming systems. Landscape and Urban Planning 41: 209-227.

Wilson, J.D., Evans, J., Browne, S.J., King, J.R., 1997. Territory distribution and breeding success of skylarks *Alauda arvensis* on organic and intensive farmland in southern England. Journal of Applied Ecology 34: 1462-1478.

Wretenberg, J., Lindström, Å., Svensson, S., Thierfelder, T., Pärt, T., 2006. Population trends in farmland birds in Sweden and England: similar trends but different patterns of Agricultural intensification. Journal of Applied Ecology 43: 1110-1120.