A choice experiment on hybrid result-based agri-environmental scheme contracts for meadow bird conservation with Dutch farmers

MSc Thesis

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Abstract

In the Netherlands, meadow bird management is based on action-based agri-environmental schemes. However, bird populations are declining, and the effectiveness of action-based schemes is questioned. In theory, result-based schemes can be a promising alternative to improve ecological effectiveness, but they tend to have low practicality due to the need for feasible measurement methods of the environmental result. Therefore, this study focuses on hybrid result-based schemes with both a fixed payment per hectare and individual and collective bonuses for environmental results. Because participation in agri-environmental schemes is voluntary, their success depends on farmers' acceptance of the scheme contract. This study investigates the conditions under which a farmer is willing to participate in a hybrid result-based meadow bird scheme contract. The analysis is based on a discrete choice experiment with Dutch farmers that engage in meadow bird management. Based on a sample of 94 respondents, the results show that almost three-quarters of the respondents is willing to participate in hybrid result-based contracts. Farmers are more likely to participate when an individual bonus of €5000 or a collective bonus of €1000 is offered in the contract. Farmers are less likely to participate when monitoring is carried out by the public control agency (NVWA), when they have less flexibility, when the mowing date is delayed, and when stricter rules on fertilizer and pesticide use are in place.

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1. Introduction

1.1 Background

As the global demand for food grows in the context of climate change, the relationship between agriculture and nature receives increasing attention (Coyne et al., 2021). Various European policy initiatives underline the importance of this relationship. The European Green Deal aims to facilitate the transition to a resource-efficient and sustainable agricultural sector. Examples of actions necessary to achieve this are found in the greening of the Common Agricultural Policy, the Farm to Fork Strategy, and the EU Biodiversity Strategy (Wrzaszcz & Prandecki, 2020). Also, within the Netherlands, several actions are taken to enhance the interaction between agriculture and the environment, such as 'nature-inclusive' farming or circular agriculture (LNV, 2018). The rising demand for increased environmental quality in agricultural landscapes puts pressure on the European agricultural sector. Agriculture produces on the one hand private goods such as food. On the other hand, it can provide public goods related to the environment which can benefit society (Pajewski & Borowy, 2019). The effects of intensified agricultural production on the natural environment negatively influence the delivery of environmental goods, such as soil health, biodiversity, and healthy ecosystems (Campbell et al., 2017). For example, intensive use of agricultural lands may lead to habitat loss and the disappearance of meadow birds.

To increase the sustainability and greening of agriculture, an instrument called agri-environmental schemes (AES) is introduced as part of the second pillar of the EU's Common Agricultural Policy (Jongeneel & Polman, 2018). These schemes aim to stimulate farmers to voluntarily take agri-environmental measures and offer compensation payments in return. These measures concern, for example, practices to improve biodiversity and the quality of soil, water, and air. In general, AES can be applied in two ways that differ in the method of payment (Bartkowski et al., 2021). The first method compensates farmers for the management practices they carry out to achieve environmentally beneficial results, regardless of the actual results. Schemes based on such payments are called action-based schemes. In these schemes, conservation practices are rewarded, whereas in the alternative type of schemes, conservation results are rewarded. The latter are called result-based schemes and imply a payment to farmers for a quantifiable environmental result. Hybrid schemes combine both action- and result-based elements (Herzon et al., 2018).

1.2 Problem definition

Most of the AES that are implemented in the EU are action-based, including in the Netherlands. Although action-based schemes are common, the schemes can fail at producing the desired ecological benefits (Bartkowski et al., 2021). This can be partly explained by the lack of linkage between payment and environmental results. Recently, a shift in focus from an action-based to a

result-based approach is considered in the agri-environmental policy framework (O'Rourke et al., 2020). This is because, in theory, result-based schemes can lead to better environmental results, since they can provide a clear link between rewards and results, can allow for more flexibility in management measures, and can be more cost-effective (Russi et al., 2016). Despite the potential benefits of these schemes, they are still rare in Europe.

This thesis focuses on hybrid result-based schemes for meadow bird conservation under AES in the Netherlands. Dutch agricultural grasslands are an important habitat for bird species; for instance, 87% of the global black-tailed godwit population breeds on Dutch territory (Kok et al., 2020). Unfortunately, this population decreases, and the same applies to other meadow bird species (Van Groen, 2020). The Dutch AES seems unable to sustain bird populations, even though many farmers make substantial efforts (Algemene Rekenkamer, 2021). In the last twenty years, the amount of payments for participating farmers has increased eightfold, while the size of the black-tailed godwit population has been reduced by half, which can indicate the ineffectiveness of policies. This is alarming, but there are opportunities to prevent further decline (Van Groen, 2020). That is why it is important to consider other forms of AES contracts for meadow bird conservation, and a hybrid result-based scheme can be a promising alternative. Since participation in AES is voluntary, success depends on farmers' acceptance of the scheme (Schroeder et al., 2013). Therefore, the question is under what conditions farmers would accept a hybrid result-based scheme. Research on farmers' preferences towards different types of result-based schemes is scarce (Šumrada et al., 2021). This thesis contributes to this knowledge gap by conducting a choice experiment on farmers' preferences for a hybrid result-based scheme contract with Dutch farmers.

1.3 Research objective and research questions

The research objective of this thesis is to design and empirically test a new hybrid result-based agri-environmental contract to improve the conservation of meadow birds by exploring participation preferences of Dutch farmers that are engaged in meadow bird management.

The research questions are:

1. *What is the current design of agri-environmental schemes and meadow bird conservation schemes in the Netherlands?*
2. *What are incentives for farmers to participate in agri-environmental schemes?*
3. *What are the advantages and disadvantages of result-based and action-based schemes?*
4. *What is an appropriate design for a discrete choice experiment based on hybrid result-based schemes for meadow bird conservation in the Netherlands?*
5. *What conditions determine the acceptance of hybrid result-based schemes for meadow bird conservation by Dutch farmers participating in meadow bird management?*

1.4 Methodological design

The agricultural collective Noardlike Fryske Wâlden (NFW) was the main practice partner for this case study. This research was conducted through a literature review (research questions 1 to 3), and a discrete choice experiment (DCE) (research questions 4 and 5). In general, by conducting a DCE, both financial and non-financial factors influencing preferences can be investigated (Train, 2009). Prior to the DCE survey, a focus group was organized to optimize the design of the experiment. The DCE survey was conducted online with 94 farmers who participate in meadow bird management. In the survey, farmers were asked to state their preference over hypothetical choice sets. The choice sets contained two alternative contracts and a status quo option (a possibility to choose neither alternative). The different contracts had different levels of attributes, and respondents chose their preferred alternative. This choice is based on a trade-off between the different attributes (Koemle & Yu, 2020). The econometric methods used for performing the empirical analysis were a mixed logit model, a conditional logit model, and an ordinary least squares regression. This allowed determining whether preferences of farmers to participate are significantly influenced by the attributes.

1.4 Content overview

This thesis is structured in the following way. First, in chapter 2, a brief literature review is provided. In section 2.1, the design of AES in the Netherlands is discussed. Section 2.2 describes incentives for Dutch farmers to participate in AES. Section 2.3 gives an overview of advantages and disadvantages of result-based and action-based schemes. In chapter 3, a description of the design of the choice experiment and estimation methods are given. Chapter 4 presents the results. In chapter 5, result interpretation and a critical reflection are given. Chapter 6 provides a conclusion.

2. Literature review

2.1 Agri-environmental schemes in the Netherlands

2.1.1 AES and the role of agricultural collectives

Biodiversity is declining strongly worldwide, including in the Netherlands (Van Doorn et al., 2019). One of the reasons for this loss is agriculture, but agriculture can also contribute to its recovery. In the EU, AES are the main tool for nature conservation aiming to restore biodiversity in agricultural landscapes (O'Rourke et al., 2020). The schemes are implemented under the second pillar of the European Common Agricultural Policy (CAP). Farmers can voluntarily enter AES contracts to implement environmentally friendly measures on their fields to provide environmental goods as well as food. In return, participating farmers receive compensation payments.

In 2012, EU AES were revised with the aim of increasing ecological effectiveness. In the new AES, the core element is the habitat approach which focuses on creating and maintaining habitats for species or a group of species that require a similar environment (Boonstra & Nieuwenhuizen, 2019). With the introduction of the EU Rural Development Regulation (Regulation (EU) No 1305/2013, Article 28) in 2014, group participation in AES is made possible, alongside individual participation (Groeneveld et al., 2019). In the Netherlands, the implementation of the new AES is different compared to other EU countries. From 2016 onwards, participation in the Dutch AES is only possible via so-called agricultural collectives. Therefore, the collectives are central in the implementation of the Dutch AES (Boonstra et al., 2021). An agricultural collective is a local partnership of which the members are farmers and other land managers (Barghusen et al., 2021). Forty collectives cover the whole territory of the Netherlands. Coordination tasks such as identifying which farmers want to participate, what measures they want to perform, and on what parcels they perform these measures are all carried out by the collective. Collectives draw up a nature conservation strategy that forms the basis of the AES contracts with their members. The province assesses this strategy and verifies whether it is in line with the provincial nature management plan. If the strategy is approved, government subsidies become available. In turn, collectives redistribute the payments based on the voluntary contracts with their farmers (Barghusen et al., 2021).

2.1.2 Meadow bird management

The habitat approach distinguishes four different types of habitats: open grassland, open arable land, dry and wet infrastructure. The habitat area open grassland contains landscapes with mainly grassland (Melman et al., 2014). In this living area, the main focus is on bird species that breed in grasslands, called meadow birds. Examples of meadow birds are the black-tailed godwit, the

oystercatcher, the redshank, and the lapwing. To be attracted to and to survive in a region, these birds demand a certain environment. Farmers participating in open grassland management for meadow birds aim to create such an environment by contributing to so-called meadow bird habitat mosaic areas. A mosaic is a spatially coherent area with a diversified landscape that is beneficial for meadow birds (Weterings et al., 2015). In these areas, birds can breed safely, and chicks can find enough food to grow up. In the process of creating such an area, farmers are supported by meadow bird management directors, who are experts on this subject. Farmers can choose from eight different management measures to form habitat elements in their fields. They receive payments per performed measure. These measures are not mutually exclusive, and some can be combined. The eight different management measures for bird management on open grasslands are shown in table 1.

Table 1 Set of measures for meadow bird management

Measure	**Description**
Clutch management	Nests are being marked to make them visible during agricultural activities.
Grassland with resting period	Mowing is delayed creating a period of rest for the breeding process and the growing up of young meadow birds.
Chick fields	These fields cannot be mowed until the chicks are sufficiently grown.
Herb-rich grassland	These grasslands are created to attract insects which are a food source for birds.
Extensive grazing	Grazing can result in structured grass patterns that allow chicks to hide in the grass.
Rough manure	Spreading rough manure can provide birds with food and structured grass.
Raise the water level	A higher water level creates wet conditions that can attract insects.
Ditch inundation	Ditches are inundated to attract birds to rest and to feed on insects.

The integration of these measures into agricultural business practices can be difficult (Visser & Melman, 2018). Some measures are easier to implement than others. For example, clutch management is relatively easy to fit into agricultural activities. This measure is the most frequently applied; it covers more than half of the total area under meadow bird management in the Netherlands (Algemene rekenkamer, 2021). However, effects on chick survival rates can be minor if other important measures to improve the conditions of the grassland are not taken

(Visser & Melman, 2018). The creation of wetlands, by contrast, is a relatively heavy measure to take because it usually involves high costs. This is also reflected in the limited prevalence. *Ditch inundation* occurs only on 0.5% of the total area under meadow bird management, even though this measure can have a significantly positive impact on the living environment of meadow birds (Algemene rekenkamer, 2021).

2.2 Factors affecting participation in agri-environmental schemes

2.2.1 Farmers' incentives

Different factors can influence farmers' participation in AES, of which five general factors are as follows. First, an important incentive can be rewards, both social and financial, for efforts (Runhaar et al., 2020). Financial rewards are seen as especially attractive due to the costs and efforts in implementing the schemes, but social rewards can also play a role. If efforts in nature conservation are appreciated by society, this can have a positive impact on the sector's image. Second, less strict rules and more flexibility when participating can be an incentive to be committed to nature conservation (Westerink et al., 2019). A certain degree of autonomy in choosing and taking measures can influence the motivation of farmers positively (Runhaar et al., 2017). More flexibility in a contract can give farmers more freedom to determine what they want to do within the established framework. In this way, their decisions can be based on local conditions such as the weather, the number of birds at the time and the condition of the grass. Flexibility can also leave room for withdrawing from the scheme for farmers who think it can be risky to commit to a long-term contract. Although less strict rules and flexibility in a contract can incentivize farmers, it is also important to provide clarity within the contract. Rules that continuously change can be demotivating for farmers (Westerink et al., 2018). Third, an incentive to participate can be the availability of help from others (Runhaar et al., 2020). Help can be provided in different ways such as volunteers who assist in monitoring and protecting nests of meadow birds. Also, volunteers can inform farmers about bird species or indicate when it is allowed to mow, for example. Such collaboration between farmers and volunteers can create enthusiasm, just like cooperation between farmers (Westerink et al., 2018). Fourth, an incentive for farmers to participate can be knowledge about agri-environmental measures and their benefits (Runhaar et al., 2017). If information about the possibilities and benefits is provided, the ability of a farmer to act can increase. Exchange of knowledge and experiences between farmers can be useful and can increase motivation (Westerink et al., 2018). More knowledge can also lead to more awareness of different aspects of nature in the surrounding farm areas. In this way, participating in nature conservation can become more enjoyable for farmers (Westerink et al., 2019). Finally, farmers' attitudes are an important element in explaining participation in AES

(Batáry et al., 2015). Farmers can have an intrinsic incentive that can lead to responsibility for environmental processes on their fields. Having a heart for nature and being interested in its processes can generate joy for farmers (Westerink et al., 2018). In this way, personal considerations play an important role in the integration of nature conservation measures into farm management.

2.2.2 Incentives resulting from the type of agri-environmental measure

The type of AES measure can influence whether farmers are incentivized to participate or not. This is because of three factors, among others. First, the ease of fit of an agri-environmental measure into the existing farm management practices can affect incentives (Batáry et al., 2015). If major changes in the existing farm methods have to be made to perform a certain measure, farmers can be less incentivized to participate. This can be the case for heavy measures in particular (Westerink et al., 2019). For example, the application of ditch inundation can require a greater change in the farm business than the implementation of clutch management. Second, the suitability of the type of AES measure in an area can affect farmers' incentives (Runhaar et al., 2020). Certain types of nature management can be more suitable in specific areas than in other areas. For example, the chance of successfully managing meadow birds can be higher in one region than in the other just because of the prevalence of birds in that region. Third, the visibility of the results of a measure can be an incentive for farmers to participate (Runhaar et al., 2017). For example, beautiful field margins, a visible number of meadow birds, or the presence of butterflies can motivate farmers.

2.3 Result-based and action-based schemes: advantages and disadvantages

2.3.1 Action-based schemes

Currently, most of the AES within the CAP framework are action-based (Bartkowski et al., 2021). In action-based schemes, participating farmers receive payments based on the actions they perform. As described earlier, participating farmers can choose from a set of different management measures with varying payments. The payments differ per measure since they usually cover estimated costs or revenue losses caused by the actions taken (Kuhfuss et al., 2016). For example, the compensation for the measure delayed mowing is based on lower grass yields and a lower quality, which has to be compensated by other feed (Strang, 2016). The set of different measures is assumed to ensure that there are suitable measures for every participating farmer for various land types (Arnott et al., 2019).

Although action-based AES are common, they are being criticized for a couple of reasons (Moxey & White, 2014). Participating farmers can experience less freedom and can have fewer possibilities to be innovative. Prescribed measures offer less flexibility to consider local conditions (Bartkowski et al., 2021). Besides, emphasis is on measures and loss of income due to these measures instead of on achieving environmental objectives. Hence, there can be a low priority on actual results (Herzon et al., 2018). Third, action-based schemes can fail to influence farmers' attitudes to the environment. As a result, they can be seen as ineffective in the long run (Arnott et al., 2019).

2.3.2 Result-based schemes

A promising alternative type of scheme can be the result-based scheme (Olivieri et al., 2021). As opposed to action-based schemes, result-based schemes have payments based on environmental results rather than management actions taken. For example, participating farmers can be paid based on the number of clutches or number of meadow bird species in their fields. Result-based schemes can be purely result-based, meaning that there are no management actions specified at all, and payments are based on environmental results only (Herzon et al., 2018). They can also be hybrid, containing both action- and result-based elements. For example, a hybrid scheme can have a basic payment for certain management measures, and a bonus payment for environmental results.

In general, result-based approaches to AES tend to be more ecologically effective than action-based approaches (O'Rourke et al., 2020). This is because of the following three reasons, among others. First, result-based schemes have a direct link between payments and desired environmental results (Arnott et al., 2019). In this way, the schemes can shift focus from compensating negative revenue losses due to management measures to rewarding positive environmental results. Second, participating farmers can be encouraged to fully understand the ecological conditions needed to deliver the environmental outcome that is financially rewarded (Cullen et al., 2018). The production of the environmental good can then become part of the agricultural business. Also, a result-based scheme can ensure that the farmer will take measures that the farmer thinks are most effective within his or her local circumstances. Third, result-based schemes can be less prescriptive than action-based schemes. Fewer restrictions in management measures can increase the attractiveness of the schemes (O'Rourke et al., 2020). This flexibility makes that participating farmers have the possibility to choose more context-specific measures and can use their knowledge to innovate. In this way, they can experience more freedom and autonomy. Also, more flexibility in management measures can result in a better relationship with the monitoring agent (Olivieri et al., 2021). Conflicts can be reduced because less strict management standards have to be met.

However, in practice, result-based approaches can be challenging to implement. One of the reasons for this is that these schemes can entail risks regarding payments for the farmer because the targeted environmental result can be variable, unpredictable, and can be influenced by factors beyond the farmer's control (Drechsler, 2017). For example, the threat of predators or behavior of neighbors can negatively affect the breeding success of meadow birds. Another reason for the challenging implementation is that result-based schemes require adequate measurement of environmental results (Bartkowski et al., 2021). In some cases, this is not feasible due to high costs or interference with environmental processes. Moreover, the observation of mobile species, like meadow birds, can be difficult. For example, going into a field to count nests will scare away birds.

When environmental results cannot be measured in a reliable way and when there is a high risk of variable payments, a hybrid instead of a pure result-based scheme can be considered (O'Rourke et al. (2020). In this way, contracts do not have to be either result-based or action-based; elements of both approaches can be complementary.

2.4 Summary

AES are the main tool for nature conservation in the EU, including in the Netherlands. Dutch farmers cannot participate individually, but only collectively via their agricultural collective, which is a local partnership of farmers. Farmers can have different incentives to participate in AES, such as social and financial rewards, flexibility, knowledge, and help from others. Also, the ease of fit of agri-environmental measures into the existing farm practices, the prevalence of species, and the visibility of results can affect participation.

In action-based schemes, farmers are paid per measure which ensures that every farmer can choose a suitable measure. However, action-based schemes can be ineffective in the long run due to inflexibility, less freedom, and fewer options to be innovative. Result-based schemes can be more effective because of the direct link between payments and results, fewer restrictions, and the insight into ecological conditions for results. Nevertheless, this approach can also be challenging since it can entail risks in payments caused by variable results. Also, adequate measurement methods for results are not always available. These factors are the reason why result-based schemes are often hybrid schemes with both prescribed measures and result-based elements. In the next chapter, the methodology for a discrete choice experiment focusing on a hybrid result-based scheme for meadow bird conservation in the Netherlands is described.

3. Methodology

In this chapter, the methodology is described. A brief description of the geographical context is provided in section 3.1. Section 3.2 explains the discrete choice experiment. The design of the choice experiment is described in section 3.3. Finally, section 3.4 specifies the econometric estimation.

3.1 Geographical context

The agricultural collective *Noardlike Fryske Wâlden* (NFW) was the main practice partner for this case study. NFW is located in northeast Friesland, a province in the north of the Netherlands. Figure 1 indicates the location of NFW in yellow. NFW is characterized by its high variety of landscape elements and unique flora and fauna. Almost 200 farmers of the NFW participate in meadow bird management schemes, and meadow bird management is carried out on approximately 3000 hectares in NFW. This area is indicated in light blue in figure 1.

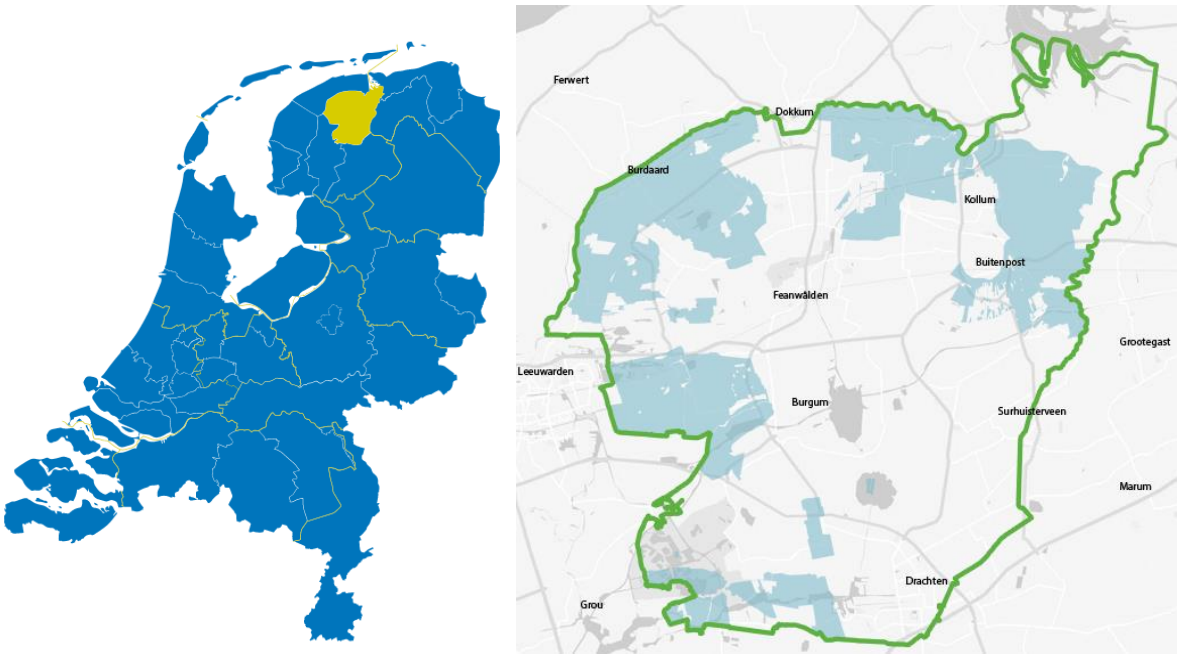

Figure 1 Noardlike Fryske Wâlden location (in yellow on the left side of the figure) and meadow bird management area (in light blue on the right side of the figure)

NFW played the main role in providing background information and in developing the methodology for this study, but to collect responses to the choice experiment, other collectives were approached as well. These collectives are *It lege midden, Súdwestkust, Rijn, Vecht en Venen* en *Collectief Midden Groningen.* They are located in various parts of the Netherlands. Just as NFW, *It lege midden* and *Súdwestkust* are located in Friesland. *Collectief Midden Groningen* is also situated in the northern part of the Netherlands in the province Groningen. *Rijn, Vecht en Venen* is a collective in the western part of Utrecht, in the middle of the Netherlands.

3.2 Method: discrete choice experiment

To analyze farmers' preferences for the conditions under which they would participate in a result-based AES, a DCE was used. In a DCE, the respondents' choices between different alternatives are analyzed (Train, 2009). Different alternative contracts formed a choice set. Each choice set included an unlabeled design, which means that no labels were used to describe the type of hybrid result-based scheme contract. Instead, all the information of the contract was captured by the attributes. The choice sets consisted of two alternative hypothetical contracts and a status quo. The status quo option was the possibility to choose none of the contract alternatives. Six or seven choice sets were successively presented to farmers. In the choice sets, each alternative contract had a different combination of attributes with varying levels. Farmers were asked to choose the option they prefer, which reflects a trade-off between the different attributes (Koemle & Yu, 2020). Based on these choices, farmers' preferences for the design of a hybrid result-based scheme could be derived. When a respondent chose one of the two contracts, and not the status quo option, he/she was also asked to specify how many hectares of land he/she would enroll in this contract.

Apart from the choice experiment, respondents were presented with a set of questions about their socio-demographic characteristics, their attitudes towards meadow bird management, and information about their farms. This background information helped to explain the determinants of farmers' choices whether or not to participate in the different contracts.

3.3 Experimental design

3.3.1 Steps taken

The final design of the DCE was based on literature research and a series of discussions with experts (meadow bird management director and coordinator) of the agricultural collective NFW. Also, a focus group with local farmers was organized. Besides, a test survey was conducted with a farmer engaged in meadow bird management outside the study area. In figure 2, the steps taken in the design process are shown.

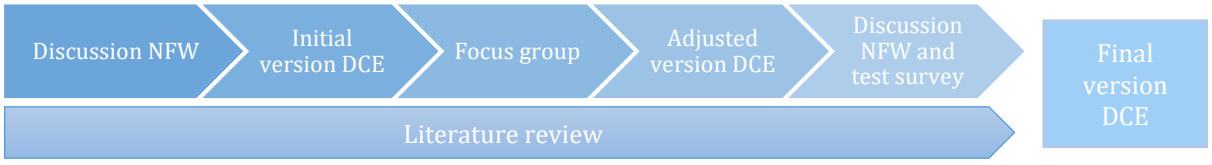

Figure 2 Design process DCE

Multiple telephone calls were made to local stakeholders and experts to discuss the proposed result-based scheme to create a scheme that is as realistic as possible. The design, desirability, and practicability of a result-based meadow bird scheme were discussed. These conversations took place in the period from September to December. The focus group was organized on November 8, 2021, in the office of NFW in Buitenpost and lasted for 90 minutes. Six local farmers of the NFW and an expert in meadow bird management participated in the focus group. These farmers all participate in meadow bird management and have a lot of expertise in it. The purpose of holding discussions and conducting a focus group was to verify three elements. First, the introductory text was read to ensure that it was clear, concise, and contained enough information to make well-considered choices. Second, the attributes and their levels were discussed whether they were perceived as relevant and realistic regarding local environmental and financial aspects. This was done because it is important that the levels assigned to each attribute take local conditions into account (Koemle & Yu, 2020). Third, the complete survey was read through to check whether all the questions and answer options were realistic and understandable.

3.3.2 Choice of hybrid result-based scheme

The attributes in the choice sets of this DCE represent a hybrid result-based scheme. A hybrid scheme was chosen because a pure result-based scheme with payments depending solely on results would not be suitable for this choice experiment. This is because, as described in section 2.3.2, a pure result-based scheme must have a feasible measurement method of results, which was not the case in this study. Four reasons for this became clear during the focus group and discussions with experts. First, a pure result-based scheme can involve too high risks of not receiving adequate payment, because the success of meadow bird management can depend on factors outside the farmers' control. For example, the behavior of neighboring farmers, movement of birds to other fields, predators, and weather conditions can influence results and in turn payments. A hybrid scheme with a base payment and a bonus payment for environmental results can reduce such risks to farmers (O'Rourke et al., 2020). Second, a payment based only on results can cause disturbance in the field. For example, a payment based on the number of nests in farmers' fields can encourage farmers to go into their fields to search for more and more nests. This causes disturbance in the meadow bird habitat which is neither necessary nor favorable since quietness is important for birds. Third, it can be the case that pure result-based schemes without any prescribed measures do not optimize meadow bird management. This is because of lower incentives to show effort since the difference in performed measures (and effort) is not directly reflected by the payment in a pure result-based scheme. Last, pure result-based schemes can result in fairness problems. Farmers who make great efforts may not be directly rewarded for this, for instance, because birds can be attracted by the ideal circumstances created by one farmer but

may nest in neighboring fields of another farmer. This is a disadvantage of measuring the results of mobile species.

These factors led to an unfeasible measurement of results, which is often seen as an obstacle of result-based schemes (Bartkowski et al., 2021). Therefore, in this study, a hybrid result-based scheme was used in which the demands of birds for quietness, food sources, structured grasslands, and a diversified landscape were tried to be met.

3.3.3 Choice of attributes

Table 2 shows an overview of the eight attributes and levels in the experiment. The first three attributes are a payment per hectare and the minimum required measures to be performed. The first attribute is the *fixed payment per year* per enrolled ha. This payment is fixed to provide farmers with a base compensation. To receive this payment, a participating farmer has to perform the required minimum measures described in attributes two and three: *mowing date* and *fertilizer and pesticide use*. The measures in these two attributes are chosen as minimum measures because it is assumed that every participating farmer can perform these measures. Also, it can be seen as a basis for the environment of the meadow birds. *Mowing date* is an attribute about the delayed mowing of grassland resulting in a resting period for the meadow birds. This base measurement is chosen since frequent mowing decreases the survival rate of chicks (Martig, 2020). The attribute *fertilizer and pesticide use* is about a ban on the use of chemical fertilizers and pesticides. These chemicals can end up in the fields in which the birds breed and live and which negatively influences the growth of herb-rich grassland (Van Groen, 2020).

The fourth attribute is *monitoring*. Monitoring includes reporting the number of hectares enrolled in the scheme and compliance with the minimum management measures. The fifth attribute *flexibility* contains two options of flexibility. The first option is flexibility for the farmer to have the possibility to adjust the contract terms annually. The second option is flexibility for the bird director to always have the possibility to ask the farmer to delay mowing according to the birds' needs. The sixth attribute *years* is about the number of years the contract is applicable.

The last two attributes are about individual and collective bonuses. The seventh attribute is the *individual bonus* for high nature engagement. This bonus is offered to create an incentive to optimize meadow bird management and to create diversified landscape elements. It is an individual bonus because farmers perform measures at the farm level. This attribute describes the possibility to receive a bonus if two measures that show high nature engagement are performed, namely the provision of ditch inundation from February 15th until May 15th and extensive grazing (1,5 livestock unit/ha) on some of the parcels. These two measures are chosen because both can be important elements in a suitable environment for meadow birds. According

to Melman et al. (2020), extensive grazing can significantly improve the vegetation structure in fields around ditch inundations. No specification is given about a minimum area to be submerged and a start and end date of the grazing period. This is done to give flexibility and to consider local conditions. The last attribute is the *collective bonus* for high performance in meadow bird management. Since farmers don't have full control over the place of nesting and growing up of meadow birds, this bonus is a collective one. If birds benefit from the good conditions of one farmer's fields, but breed in the fields of another farmer, both farmers are rewarded. The performance is measured by the so-called gross territorial success (*Bruto Territoriaal Succes* in Dutch). If the gross territorial success of a farmer mosaic is above the average provincial success of that same year, all the farmers in that particular mosaic receive this bonus. The gross territorial success reflects the breeding success of a breeding pair. The value is determined every year and does not cause additional disturbances in the field or in the relationship between farmers. It is the best available method to measure the presence of meadow bird chicks (Visser & Melman, 2018).

3.3.4 Data collection

Different combinations of these attributes and levels formed different choice sets. In total, twenty choice sets were generated. Table 3 shows an example of a choice set with two alternative contracts and a status quo option. Each choice set was checked for dominance and none of them contained a dominant choice alternative. The experimental design had a D-efficiency score of 93.25% on a scale from 0 to 100, with 100 meaning that the design is perfect. Designs with an efficiency score above 90% are considered to be sufficient (Kuhfeld, 2005).

The data was collected using an online survey via Survey Monkey that was open for approximately seven weeks. The survey was conducted in Dutch, the English version is provided in the appendix (A1). The online survey was distributed via email among farmers managing meadow birds of the agricultural collectives *Noardlike Fryske Wâlden*, *It Lege Midden*, *Midden Groningen*. A reminder email was sent twice. The survey was also distributed via newsletters of the agricultural collectives *Súdwestkust*, *Rijn, vecht en venen* and *It Lege Midden*. A total of 94 farmers participated in the survey, and approximately 61% of the respondents were farmers of NFW. Table A2 in the appendix shows the number of respondents of each collective. The response rate was approximately 12%.

Table 2 Attributes and their levels used in the DCE

Attribute	Description	Levels	Variable type
Fixed payment per year	Payment per ha per year to cover the cost of quality lost due to delayed mowing	€600/ha; €800/ha; €1000/ha; €1200/ha	Categorical
Mowing date	Delayed date for mowing on grassland	From 01.06; 15.06; 01.07	Dummy
Fertilizer & Pesticide Use	Bans on chemical fertilizer and pesticides, except localized control of four types of weeds (creeping thistle, bitter dock, common ragwort, and nettle).	Bans on chemical fertilizer; bans on pesticides; bans on both; no bans on both	Dummy
Monitoring	Who monitors? Monitoring includes reporting amount of ha enrolled and compliance with minimum management requirements	Bird director; Local bird protector; Public agency (NVWA)	Dummy
Flexibility	Flexibility can be granted to: Farmer: option to adjust the terms of the contract annually Bird director: option to delay mowing according to the birds' needs	Farmer; Bird director; Both; No Flexibility	Dummy
Years	The number of years the contract is applicable	2; 6; 10	Categorical
Individual bonus	Bonus is paid if both measures are performed voluntarily: 1) Ditch inundation 15.02 – 15.05 2) Extensive grazing (max 1.5 Livestock units/ha) Farmers are compensated with €1,500/ha ditch inundation and €580/ha extensive grazing	€1000/farmer; €5000/farmer; No bonus	Dummy
Collective bonus	Bonus for increase in birds. Bonus is paid if the Bruto Territorial Success (BTS) value of the mosaic exceeds the average provincial value of that year.	€500/farmer; €1000/farmer; No bonus	Dummy

Table 3 Example of a choice card used in the DCE

	Alternative 1	**Alternative 2**	**Alternative 3**
Fixed payment per year	€600/ha	€1000/ha	Neither of the alternatives
Mowing date	01.06	01.07	
Fertilizer & Pesticide Use	No bans	Bans on both	
Monitoring Measures and ha	Local bird protector	Bird director	
Flexibility for: Farmer: yearly adjustable contract Bird director: delay mowing to birds' needs	Farmer and bird director	No Flexibility	
Years	6	2	
Individual bonus For providing ditch inundation and extensive grazing on part of the plots. Comes on top of the compensation of €1,500/ha ditch inundation and €580/ha extensive grazing AND the fixed payment.	€5000/farmer	€1000/farmer	
Collective bonus For a higher BTS value of the mosaic than the average provincial BTS value	€500/farmer	No bonus	
I choose	☐	☐	☐

<u>If chosen for alternative 1 or 2:</u>

- How many hectares would you enroll in this contract?

  _____ ha

- Would you provide ditch inundation and extensive grazing on part of your fields?

  ☐ Yes

  ☐ No

3.4 Econometric estimation

The econometric methods used for the empirical analysis were a mixed logit model, a conditional logit model, and an ordinary least squares regression. These methods were used in three steps in the econometric analysis. First, a mixed logit model was used to analyze the effects of the contract attributes on the probability a farmer chooses one of the two hybrid result-based scheme contracts, their marginal effects, and the willingness to accept a contract. Second, a conditional logit model was used to determine the effect of the farm and farmer characteristics on the decision to participate in a hybrid contract. A conditional logit instead of a mixed logit model was used because the performance of random draws can make a mixed logit estimation complex, especially with a relatively low number of observations. In this conditional logit estimation, the characteristics were included as interaction effects with the alternative specific constant. This constant takes a value of one if a contract is chosen and zero if the status-quo is chosen. The interaction effects show the influence of characteristics on the decision to choose one of the two contracts. Third, an ordinary least squares regression was carried out to assess the effect of the contract attributes and farm and farmer characteristics on the number of hectares enrolled in a contract.

Some basic assumptions of the choice experiment are as follows. It is assumed that the decisions made by the respondents are based on utility maximization (Mariel et al., 2021). The N respondents are asked to choose their preferred alternative j^* from alternatives J. A n respondent chooses the alternative with the highest utility for him or her. According to Lancaster (1966), the utility of a good is determined by the individual attributes of a good. So, the level of utility U_{jn} differs per alternative, and is defined as follows:

$$U_{jn} = V_{jn} + \varepsilon_{jn} \tag{1}$$

With the observable component V_{jn} and the unobservable component ε_{jn} of utility. The observable component contains k characteristics of the result-based scheme contract x_j. The influence of the attributes is described by the parameters of interest β. According to Lancaster (1966), the utility is assumed to be a linear function of the attributes:

$$U_{jn} = \boldsymbol{x}'_{jk}\beta_{kn} + \varepsilon_{jn} \tag{2}$$

The conditional logit model defines the probability that respondent n chooses alternative j as follows:

$$L_{jn}(\beta_{kn}) = \frac{\exp(\boldsymbol{x}'_{jk}\beta_{kn})}{\sum_j \exp(\boldsymbol{x}'_{jk}\beta_{kn})} \tag{3}$$

The conditional logit model has the assumption that the estimated preferences are the same for all respondents. This assumption does not hold in the mixed logit model, which assumes that the estimators β are specific to each respondent and continuously distributed. In a mixed logit model, this distribution is conditional on β_{kn}, and the probability that farmer *n* chooses alternative *j* is:

$$L_{jn}(\beta_{kn}|\, M) = \frac{\exp(\boldsymbol{x'}_{jk}\beta_{kn})}{\sum_j \exp(\boldsymbol{x'}_{jk}\beta_{kn})} \quad (4)$$

With M describing the moments of the distribution. The probability that farmer *n* chooses alternative *j* is an integral over the values of β:

$$P_{jn}(M) = \int_{\beta kn} L_{jn}(\beta_{kn})\, f\,(\beta_{kn}|M) d\beta_{kn} \quad (5)$$

Random draws are performed to solve the mixed logit model.

When a respondent chooses one of the two contracts, respondent *n* can specify the acreage enrolled Y_{jn} depending on Z_{jn}, which is a vector including the characteristics of the chosen contract *j* and the individual characteristics of the farm and farmer *n*. The ordinary least squares regression is defined as follows:

$$Y_{jn} = \boldsymbol{Z'}_{jn}\alpha + u_{jn} \quad (6)$$

And also depends on unobservable factors u_{jn}.

3.5 Summary

The agricultural collective *Noardlike Fryske Wâlden* (NFW) was the main practice partner for this study in the development of the DCE. The design of the DCE was based on literature research, discussions with experts as well as a focus group with local farmers. For the DCE, a hybrid result-based scheme was chosen rather than a pure result-based scheme because of unfeasible measurement methods of results. In general, a DCE consists of contracts with different combinations of attributes with varying levels, forming choice sets. The DCE conducted for this study contained six or seven choice sets, in which two alternative contracts and a status quo were included. The respondents chose their preferred option in every choice set, on the basis of which farmers' preferences for the contract design of the result-based scheme could be derived. The next chapter presents the results of the DCE.

4. Results

In this chapter, the results are presented. First, the sample is described. Second, the results on the conditions under which a farmer is willing to participate, their marginal effects, and the willingness to accept a contract are reported. Third, results on enrolled hectares and the effects of farm and farmer characteristics on participation are described.

4.1 Descriptive statistics

In total, 94 farmers completed the questionnaire. All the respondents are engaged in meadow bird management. The descriptive statistics of the sample are presented in table 4. The average respondent is 51 years old, has 28 years of experience in farming, and has a household of 4 persons. 70% of the respondents completed higher education. On average, a respondent has 60 hectares of grassland, 87% of the respondents has a conventional farm business, and 70% has a dairy farm. On average, a respondent owns approximately 126 cows, and the average milk production per cow is 7820 kg in 2021. 74% of the respondents runs his or her farm fulltime, and approximately half of the respondents assesses it as financially stable. The average risk perception concerning the application of new methods is 2.56 on a scale from 1 (risk-loving) to 5 (risk-averse). Regarding meadow bird management, 10% has managed more than 75 nests in 2021, and 56% is satisfied with the current meadow bird scheme contract. More than half of the respondents values his or her own knowledge of meadow bird management as good. Approximately 44% of the respondents applies ditch inundation, 17% performs extensive grazing, and 52% has herb-rich grassland. 12% of the respondents performs both ditch inundation and extensive grazing.

Table 4 Descriptive statistics of the sample

Variables	Description	Mean (st. dev.)
Age	Age in years	51.22 (11.57)
Experience	Experience in farming in years	27.78 (13.49)
Household	Size of household in persons	3.84 (1.90)
Higher education	Farmer completed higher education (dummy)	0.70
Ha grassland	Hectares of grassland	60.22 (46.92)
Conventional	Farm is conventional (dummy)	0.87
Dairy farm	Farm is a dairy farm (dummy)	0.70
Cows	Number of cows a farmer owns	125.64 (96.98)
Milk production per cow	Milk production per cow in 2021	7819.90 (1962.61)
Fulltime	Farmer runs farm business fulltime (dummy)	0.74
Risk	On a scale from 1 to 5, farmer agrees with the statement: new working methods should be proven first before applying them	2.56 (1.17)
Financial stability	Farmer assesses farm business as financially stable (dummy)	0.49
Bird nests	High amount (>75) of bird nests managed in 2021 (dummy)	0.10
Ha under management	Hectares under meadow bird management	22.64 (20.92)
Satisfied	Farmer is satisfied with current meadow bird scheme contract (dummy)	0.56
Preference	Farmer prefers result-based payments over action-based payments (dummy)	0.15
Knowledge	Farmer assesses own knowledge about meadow bird management as good (dummy)	0.54
Ditch inundation	Farmer performs the measure ditch inundation	0.44 (0.50)
Extensive grazing	Farmer performs the measure extensive grazing	0.17 (0.38)
Herb-rich grassland	Farmer performs the measure herb-rich grassland	0.52 (0.50)
Heavy measures	Farmer performs ditch inundation and extensive grazing (dummy)	0.12

4.2 Estimation results

4.2.1 Analysis of participation

To assess the conditions that determine the participation of farmers in the result-based AES, a mixed logit estimation was performed based on 1644 observations of choices made by farmers. The coefficients, p-values, and marginal effects are shown in table 5.

The coefficients of the mixed logit model cannot be interpreted directly, only the direction of the effect can be analyzed. The average estimated probability of choosing a hybrid result-based contract is 73.1%, compared to choosing no contract. The signs of the coefficients show that the probability of participating in the hybrid scheme increases with a contract containing a higher fixed payment, monitoring by the bird director or local bird protector, flexibility for the farmer or for both the farmer and bird director, an individual bonus of €5000 and a collective bonus of €1000. The probability of participation decreases with a contract containing delayed mowing days and bans on fertilizer, pesticides, or both. The model has a Pseudo-R^2 of 0.217. This number is quite low and can be explained by the relatively small sample size.

The estimation of the marginal effects was based on 1258 observations of farmers' choices for one of the two contracts (and not the status quo). The effects show by how many percentage points the probability to choose a contract increases or decreases. The average probability of choosing a contract increases by 0.01% if the fixed payment per year increases by one euro. An additional delayed mowing day included in the contract can result in a -0.3% lower probability of choosing a contract. The probability decreases by 6% if the contract contains a ban on fertilizer compared to a contract in which fertilizer use is allowed. Not allowing farmers to use pesticides lowers the probability by 3.7% and prohibiting the use of both fertilizer and pesticides decreases the probability by 7.7%. Compared to a contract in which monitoring is conducted by the public agency NVWA, a contract with monitoring carried out by a bird director increases the probability by 4.6%, and by 3.8% for one with monitoring done by a local bird protector. A contract that provides flexibility to the farmer increases the probability of participation by 4.4%, and flexibility provided to both farmer and bird director increases the probability by 2.4%. The probability of choosing a contract increases by 3.3% if an individual bonus of €5000 is included, compared to a contract in which no individual bonus is offered. In case a collective bonus of €1000 is offered, the probability of choosing a contract increases by 5%, compared to a contract in which no collective bonus is offered.

4.2.2 Willingness to accept

The last column of table 5 reports the willingness to accept (WTA). The WTA indicates the marginal rate of substitution between an attribute and the fixed payment variable. It reflects the minimum compensation a farmer is willing to give up for a one-unit increase in an attribute that is valued positively or the compensation a farmer expects to receive for a one-unit increase in a negatively valued attribute. The overall utility change would then be zero (Mariel et al., 2021). The WTA is not reported for flexibility for bird director, years, an individual bonus of €1000, and the collective bonus of €500, since the estimated parameters are not significant at any statistical level in the mixed logit model.

The WTA of mowing date is estimated to be €31.65. This indicates that on average, at least €31.65 should be offered for one additional day in delayed mowing in the hybrid result-based contract to maintain the farmers' participation rate. The WTA of no fertilizer use is €514.14, of no pesticide use is €332.06, and of both not allowed is €672.53. This shows that at least these amounts should be offered for a ban on respectively fertilizer, pesticides, or both in a contract. The WTA for monitoring conducted by the bird director or the local bird protector are minus €464.55 and €390.48, respectively. These are negative because the average respondent is willing to choose a contract with a lower payment when monitoring is done by the bird director or local bird protector, as compared to a contract with monitoring done by the NVWA. The WTA for flexibility provided to a farmer is minus €434.39, indicating that the average respondent is willing to give up this amount when the option to adjust the contract annually is included in the contract. The WTA for the individual bonus of €5000 is minus €304.32. On average, a respondent is willing to give up this amount of fixed payment when this bonus is offered under the condition of providing ditch inundation and extensive grazing. For the collective bonus of €1000, the WTA is minus €479.82. On average, when this bonus is included in a contract, a respondent is willing to give up this amount of fixed payment.

4.2.3 Effect of farm and farmer characteristics on participation

The results of the conditional logit estimation on the influence of farm and farmer characteristics on participation in hybrid result-based schemes are shown in table 6. Likelihood ratio tests were carried out to determine whether insignificant variables could be excluded. Based on these tests, a selection of characteristics was included. The estimation was based on 957 observations of choices for a contract because only farmer's contract choices with complete farm and farmer characteristics were used. The effects show which farmers and types of farms are more or less likely to participate in a hybrid result-based contract. Farmers who are satisfied with their current contract are less likely to participate in the hybrid contract, as well as farmers who perform the measures ditch inundation and extensive grazing. A farmer who has a farm mainly on the soil type

clay is more likely to participate in the hybrid scheme contract. The other characteristics do not show an effect at any level of significance.

4.2.4 Hectares enrolled in a contract

When one of the two contracts was chosen, and not the status quo option, the respondent was asked two additional questions. The respondent was asked to specify how many hectares of land he/she would enroll in this contract and whether the respondent was willing to provide both ditch inundation and extensive grazing. The results of these questions are reported in A3 in the appendix. The results show that on average, a respondent would enroll 12.82 hectares of his/her farmland in the chosen contract, and 72% of the respondents is willing to provide both measures when an individual bonus is offered.

The results of the ordinary least squares regression on the effect of the different attributes and the farm and farmer characteristics on the number of hectares a farmer is willing to enroll in a contract are shown in table 7. The farm and farmer characteristics included in the regression were based on likelihood ratio tests. This regression was based on 218 observations. The observations contain 218 specifications of the number of hectares enrolled in a chosen contract by a farmer. On average, a farmer is willing to enroll 12.82 hectares of his/her farmland in the chosen contract. The results show that flexibility for the farmer, the bird director, and both farmer and bird director have a significant effect on the enrolled number of hectares. With regard to the farmer and farmer characteristics, knowledge about meadow bird management and the amount of grassland on a farm have a positive effect on the enrolled acreage. Level of education, being risk-averse, and performing the measures ditch inundation and extensive grazing have a negative effect on the number of hectares enrolled in a chosen contract.

Table 5 Mixed logit estimation results on effects of attributes on participation

Hybrid scheme attributes		**Coefficients**	**P-value**	**Marginal effects**	**WTA**
Fixed payment per year		0.002***	0.001	0.0001	-
Mowing date		-0.069***	0.000	-0.003	31.652 (18.398;44.906)
Fertilizer & Pesticide Use	No fertilizer	-1.118**	0.028	-0.060	514.136 (29.105;999.166)
	No pesticides	-0.722*	0.075	-0.037	332.064 (-38.857;702.985)
	Both not allowed	-1.463***	0.002	-0.077	672.526 (227.486;1117.565)
Monitoring	Bird director	1.011***	0.001	0.046	-464.554 (-814.328; -114.780)
	Local bird protector	0.849***	0.008	0.038	-390.484 (-710.828; -70.139)
Flexibility	Farmer	0.945***	0.006	0.044	-434.393 (-791.088; -77.698)
	Bird director	0.483	0.215	0.022	X
	Both	0.583*	0.096	0.024	-267.861 (-597.210;61.488)
Years		-0.013	0.709	-0.001	X
Individual bonus	€1000	-0.002	0.993	-0.000	X
	€5000	0.662**	0.046	0.033	-304.315 (-649.849; 41.220)
Collective bonus	€500	0.411	0.182	0.020	X
	€1000	1.043***	0.002	0.050	-479.817 (-843.310; -116.323)
Pseudo-R^2		0.217			
Observations		1644	1644	1248	1644

Note: *, **, *** indicates statistical significance at 10, 5 and 1%, respectively

WTA estimates are displayed as the minimum compensation in euros for a one-unit change in the value of an attribute and in case of dummies: for a dummy that takes the value of 1. Values for non-significant attributes are noted as X and confidence intervals are presented in brackets.

Table 6 Conditional logit estimation results on effects of farm characteristics on participation

Farm(er) characteristics	**Coefficients**	**P-values**
Financial stability	0.111	0.678
Cows per ha	-0.520	0.170
Milking yields per cow	0.000	0.158
Satisfied	-0.636**	0.031
Fulltime	-0.417	0.458
Ditch inundation and extensive grazing	-1.106***	0.009
Soil type: clay	0.829***	0.007
Risk perception new practices	-0.223	0.124
Observations	957	

Note: *, **, *** indicates statistical significance at 10, 5 and 1%, respectively

Table 5 OLS regression estimation results on enrolled ha in a contract

Attributes		**Coefficients**	**P-value**
Fixed payment per year		0.003	0.436
Mowing date		0.029	0.695
Fertilizer & Pesticide Use	No fertilizer	-4.125	0.129
	No pesticides	-1.597	0.451
	Both not allowed	-0.240	0.919
Monitoring	Bird director	0.686	0.695
	Local bird protector	-0.166	0.933
Flexibility	Farmer	3.916*	0.074
	Bird director	5.915**	0.034
	Both	6.167***	0.006
Years		-0.103	0.628
Individual bonus	€1000	0.998	0.608
	€5000	2.557	0.176
Collective bonus	€500	-0.308	0.878
	€1000	-2.571	0.255
Farm and farmer characteristics			
Knowledge		4.765***	0.001
Education		-3.340**	0.029
Risk-averse to new farm practices		-3.502***	0.000
Financial stability		0.884	0.528
Ditch inundation and extensive grazing		-5.392*	0.050
Milking yields per cow		0.000	0.108
Grassland		0.053***	0.001
Observations		218	

Note: *, **, *** indicates statistical significance at 10, 5 and 1%, respectively

5. Discussion

5.1 Results interpretation

5.1.1 Participation

This study analyzed the conditions under which Dutch farmers are willing to participate in a hybrid result-based meadow bird scheme contract. The estimated average probability of participating in a hybrid result-based scheme is 73.1%. This indicates that the combination of result-based elements such as the bonuses for high nature engagement and a fixed payment per hectare results in an attractive contract. This can be explained by the financial rewards for both improved ecological results and performed measures (Runhaar et al., 2020), less strict rules, and more flexibility compared to an action-based scheme (Westerink et al., 2019), and attention for the optimization of meadow bird management. Besides, a risk-mitigating effect can play a role in the attractiveness. According to O'Rourke et al. (2020), a hybrid scheme can have this effect because payments are less variable in a hybrid scheme compared to a pure result-based scheme ensuring a stable compensation for the efforts a farmer makes. Therefore, hybrid schemes can be attractive to farmers, and at the same time have the benefits of a result-based scheme can have of linking environmental results to payments and allowing for more flexibility in adapting measures to local conditions. However, the effectiveness of a hybrid scheme compared to a purely action-based scheme in terms of ecological benefits should be further investigated in practice.

Interestingly, the average number of hectares a farmer is willing to enroll is 12.8, which is almost ten hectares lower than the average of 22.6 hectares under meadow bird management in the current contract. Hence, although farmers are likely to participate in a hybrid scheme, the total amount of hectares they are willing to deliver under this scheme is lower compared to an action-based scheme. A possible explanation for this is that farmers compensate for the somewhat higher risks and effort involved in a hybrid scheme by offering fewer hectares, leaving more space on their farm for farming practices with a higher and more stable return. Further investigation is needed on the motivations for farmers to offer fewer hectares under a hybrid scheme, especially because the potential ecological implications may be high if the total area for meadow bird management would decrease by such a vast amount. Eventually, this can have major consequences for the total meadow bird population, since Dutch grasslands are an important breeding habitat for bird species (Kok et al., 2020).

5.1.2 Effects of attributes

The results of the mixed logit estimation on the effect of the attributes show that several attributes play a role in the decision of Dutch farmers to participate in a hybrid result-based scheme. Almost all attributes have a significant effect on the choice of a contract: the fixed payment per year,

mowing date, bans on fertilizer and pesticides, monitoring, flexibility for farmer or farmer and bird director, an individual bonus of €1000, and a collective bonus of €500 all influence participation. However, the effects differ in direction and extent.

First, the fixed payment per hectare per year has a positive effect on participation. The marginal effect of 0.01% may seem small, which is because of the following reason. The calculation is based on a one-euro increase in the payment attribute, but in reality, the payment would be increased by a higher amount to attract more participants; the attribute covers a broad range, i.e., €600 - €1200. Therefore, the effect can potentially sum up to a larger effect if the whole range is considered. This result is not surprising and is in line with Runhaar et al. (2020). They show that compensation for farmers' efforts and higher costs is an important condition for farmers to participate in AES. It is also underlined by a farmer who commented that fixed financial factors are key in a contract. However, not all respondents share this perspective as is shown by the comment of another farmer: "*you should participate in meadow bird management because you like it, not just for the money*". The findings of Batáry et al. (2015) are in line with this. They found that farmers' attitudes are important and can lead to a feeling of responsibility for environmental processes in their fields. This result points out that payments are essential, but intrinsic motivation also plays an important role. Moreover, although the payment attribute shows a positive effect on the participation rate, it does not affect the enrolled hectares in a contract at any level of significance. This can be an important element to investigate further.

Second, a longer delay in the mowing date is not appreciated by farmers, as shown by the negative sign of the marginal effect. This effect of 0.3% may seem quite low, but it concerns only one additional day of delay. For one additional day, farmers expect an additional €31.65 in the fixed payment per hectare per year, as compensation for the reduced quality of grass that is caused by a longer delay in mowing. This has to be offset by supplementary feeding of livestock, resulting in additional costs for the farmer (Strang, 2016). Respondents underline this and say that additional compensation for delayed mowing days is essential, since feed coming from the fields "*is not top-quality*"; especially feed coming from unfertilized fields has low quality. An issue that arises in delayed mowing is that currently, dates are postponed per week based on meadow birds' needs. However, sometimes the grass can be mowed already in the middle of that week. During the discussions with experts, it became clear that there is a growing demand for the possibility to delay mowing dates per day instead of per week. The insight that respondents expect €31.65 for one additional delayed day can be a steppingstone for future research on this.

Third, farmers negatively value bans on fertilizer, pesticides, or both. The negative effect of a ban on fertilizer use on participation emphasizes the problem the farmer experiences with low-quality grass on unfertilized fields. The participation rate decreases more when stricter prescriptions on

their use are in force, which is not surprising since a ban on fertilizer and pesticide use can negatively influence the productivity of the farm. This is stressed by the higher WTA value of a ban on both compared to the WTA values of a ban on fertilizer or pesticides separately. If a contract contains a ban on both, farmers expect to receive an additional amount of €672.53, compared to a contract in which both are allowed. Respondents considered a ban on pesticides to be less of a problem compared to a ban on fertilizer, indicating that fertilizers can be more important for farm productivity than pesticides. Future research could look into the reason for this difference.

Fourth, the number of years a contract is applicable does not have an effect at any level of significance. In this study, the contract length does not affect participation, but the flexibility option to adjust the contract terms on an annual basis does have a positive effect on participation. The results show that in exchange for flexibility for the farmer, more than €400 per enrolled hectare per year can be saved by the government. The positive valuation of flexibility is in line with the findings of Westerink et al. (2019). This is also highlighted by one of the respondents, who comments that "*flexibility and the ability to adjust the conditions year by year is the most important. […] Not one year is the same, reasoned from the perspective of both the farmer and the meadow bird"*. A lack of flexibility in a contract can result in a feeling of "*entrapment*", making farmers hesitant to settle themselves for a long-term contract. This result indicates that it is important to offer sufficient flexibility in a contract. However, it should not be at the expense of continuity, which is essential for environmental improvement as well.

Fifth, the results on the monitoring actor show that farmers do not appreciate the monitoring carried out by the NVWA. This can be seen from the directions of both effects; a contract in which monitoring is done by the bird director or the local bird protector is positively valued by farmers. The respondents like the monitoring by the bird director even slightly more. An explanation for this can be that farmers are often in close contact with their bird directors, creating more trust in them compared to distant civil servants. Farmers in the focus group also specified to have little trust in the expertise of the NVWA. This result indicates that giving local bird directors a more prominent role in monitoring seems to be a good idea. However, local engagement as well as the availability of bird directors is necessary to make this monitoring method feasible. Further research could examine whether this is practically feasible since it can improve participation.

Sixth, the results on the bonuses show that both only have an effect if sufficient money is offered. A collective bonus of €1000 positively influences the participation rate, which indicates that it is attractive for farmers to participate when this bonus is offered. The individual bonus of €5000 also positively affects participation. The results show that 72% of the respondents is willing to provide ditch inundation and extensive grazing if an individual bonus is offered. This is an

important result since these measures can be important elements in a habitat mosaic. Compared to the share of respondents that currently apply ditch inundation and extensive grazing (12%), 72% seems to be a quite high share. This illustrates the potential of the use of such a bonus in a contract to improve the provision of these measures. The amount of payment offered in the individual bonus can be an explanation for this result. In the current action-based contract, farmers are compensated for these measures based on the loss in revenues and costs. In the hybrid scheme, this compensation plus a bonus is offered. This bonus has a significantly positive effect on participation in a contract, but the effect is only significant if it has a value of €5000. A bonus of €1000 seems not to be high enough to affect the participation rate. This result indicates that compensation alone may not be enough to convince farmers to perform these measures. On average, when a contract contains an individual bonus of €5000, a farmer is willing to give up approximately €300 per hectare per year. This makes sense if you would compare the amount lost to the amount they would receive. On average, farmers enroll approximately 12 hectares in the hybrid contract. If €300 per hectare is given up, they would receive €3600 per hectare per year less, but in return, they are offered a yearly €5000 bonus. So, they are better off with the bonus. This result indicates that the government could save €300 per enrolled hectare per year to maintain the participation rate, or the fixed payment could be kept at the same level, and the participation rate would increase.

5.1.3 Effects of farm and farmer characteristics

The results on the influence of farm and farmer characteristics on participation in hybrid result-based schemes show that the following characteristics have an effect. Farmers who are satisfied with their current contract are less likely to participate in the offered hybrid contract. Even though the hybrid contract offers an attractive individual bonus for farmers who perform both ditch inundation and extensive grazing, farmers who currently perform these measures are less likely to participate in the hybrid scheme. An interesting result is that farmers who have a farm mainly on the soil type clay are more likely to participate in the hybrid contract. This is an important result because landscapes with clay or clay-on-peat soils tend to be suitable habitats for meadow birds. For example, the highest densities of godwits appear on clay soils in the Netherlands (Vermeersch & Devos, 2015).

The results on the effect of farm and farmer characteristics on the enrolled number of hectares in a chosen contract show that a farmer who has the idea that he/she has knowledge about meadow bird management positively affects the number of hectares. This is in line with the findings in section 2.2.1 that knowledge about measures and their benefits can be an incentive to participate. According to Westerink et al. (2018), motivation can be boosted by exchanges of knowledge and experiences. This result indicates that it is important to share knowledge about managing

meadow birds to have more farmers motivated to participate and to enroll a greater acreage in meadow bird management. Even though knowledge has a positive effect, a farmer who is highly educated enrolls fewer hectares in a contract. This result seems to be contradictory and should be further investigated. Risk avoidance in the adoption of new farm practices has a negative effect on the enrolled ha, indicating that the hybrid scheme may be perceived as riskier.

5.2 Critical reflection

5.2.1 Limitations design DCE

There are a couple of limitations to the design of the DCE analyzed. First, in this DCE, a hybrid scheme was developed in which the view of farmers, the ecological effects, and practical aspects were considered. The discussions with experts and the focus group provided important insights into various aspects, such as the challenges of meadow bird management or the unattractiveness of a pure result-based scheme for both farmers and nature. Although these insights regarding meadow bird management were tried to be taken into account in the designed scheme, it is difficult to capture the complexities of ecological systems in an agri-environmental scheme in general. This was also underlined by one of the respondents, who said that it is doubtful whether birds benefit from this scheme, and that it is based on "*a revenue model for the farmer*". This indicates that the designed hybrid scheme for meadow bird management was not perfect; many other elements could be considered. For example, one farmer commented that predators are important to take into account, since they are a major threat to birds, and it is almost impossible to compete with them. Future research could investigate further how a hybrid result-based scheme can be tailored to the complexities of the ecological system of which meadow birds are part of.

Second, the selection of attributes can be seen as one of the key issues in the design of a choice experiment (Koemle & Yu, 2020). In this study, a combination of literature review, discussions with local experts, and a focus group were carried out to explore possibilities for a result-based scheme and to consider local conditions. However, only one focus group was conducted due to time constraints. The farmers that participated in the focus group all came from NFW and were all heavily engaged in meadow bird management. Because of this, the group of farmers in the focus group might have been too homogeneous. In general, it is recommended to carry out two to eight focus groups for the design of a DCE (Mariel et al., 2021). Therefore, for future studies, it is advised to organize more than one focus group with farmers having different backgrounds located in different areas. Also, an important aspect in the selection of attributes is the cognitive burden to the respondent, which can affect the response rate and the reliability of responses (Koemle & Yu, 2020). On the one hand, keeping attributes as simple as possible and on the other hand making

them relevant and realistic was perceived as difficult sometimes. This choice experiment was seen as quite complex by a couple of farmers who commented that the questions are difficult to answer. The use of eight attributes in the choice experiment might have put a high cognitive burden on respondents. However, some farmers thought that the questions were interesting and "*fun to answer*".

Last, the intention was to only approach farmers of the NFW and other collectives from the province Friesland. However, due to a low response rate, farmers from collectives in other regions in the Netherlands were approached as well. Since the design of the DCE was based on views of farmers and experts of the NFW, the design was well tailored to the Friesian farmers, but therefore might be less representative for other farmers from other regions.

5.2.3 Limitations estimation

There are several limitations concerning the data and econometric estimation. First, it is important to note that the empirical analysis was based on a sample of 94 farmers, which is a quite small sample. Only part of the agricultural collectives in the Netherlands were willing to distribute the survey among their farmers who participate in meadow bird management. Since this study was based on a relatively small-scale analysis, future research is needed to expand the study regions to be able to generalize the results on preferences for hybrid result-based meadow bird scheme contracts. Also, this sample could not be representative for the entire farmer population because only farmers who participate in meadow bird management were included. This could have implications for the valuation of the attributes and the hybrid result-based scheme in general. For future research, it can be interesting to approach farmers that are not participating in meadow bird management but have the potential to do so.

Second, the small sample size influenced the econometric estimation in a couple of ways. The pseudo-R^2 of the mixed logit model took a value of 0.217, which is quite low compared to the value of 0.3, which is considered to be good. Also, the small sample size affected the estimation results. For example, the confidence intervals of the WTA were quite large. When a larger sample would be used, these intervals would become smaller. Besides, the mixed logit estimation on the effect of farm characteristics on participation could not be performed with all characteristics included due to the small sample size. The small number of observations automatically limits the number of coefficients that can be estimated. Therefore, a conditional logit model was used for this estimation and based on likelihood ratio tests, only a few characteristics were included. For future research, it is recommended to collect more responses to have higher goodness of fit, and more estimation possibilities concerning the effects of characteristics.

Third, the mixed logit model used to analyze the conditions under which a farmer is willing to choose one of the two hybrid result-based scheme contracts considers heterogeneity among the decision-makers. However, it can only reveal this to a limited extent regarding preference heterogeneity. Therefore, it is recommended in future research to perform an additional latent class estimation, which could not be done in this analysis due to time constraints. In a latent class estimation, the estimators are the same for respondents in the same class. The different classes can provide information on classes with different preferences (Hensher et al., 2018).

Fourth, the results on the effects of the attributes and farm(er) characteristics on the number of hectares enrolled in a chosen contract were based on an OLS regression. It is recommended for future research to consider the issue of selection bias, which might be present because of the likelihood that the unobserved factors affecting a farmer's choice of a contract are correlated with the unobserved factors that influence the choice of acreage (Tanaka et al., 2022). According to Kuhfuss et al. (2016), there are two ways of dealing with this selection bias: a fixed effect specification or a two-step Heckman procedure. In this analysis, these were not carried out due to time limits.

Last, one should remember that this study is based on a choice experiment with hypothetical contracts. It can be the case that farmers made choices they would not make in real life. For example, the share of respondents that would provide ditch inundation and extensive grazing when a bonus is offered is much higher in the hypothetical contract (72%) than in the current contract (12%), which could be explained by, among others, the hypothetical nature of this experiment. Because of this, it is important to consider the validity of the DCE, which ensures that the estimated values reflect the actual values – as much as possible (Mariel et al., 2021). First, content validity is an important aspect, which reflects the extent to which the DCE induces respondents to make choices in line with their true preferences. Taking the results on the effects of the attributes on participation into consideration, these can be assessed as realistic. Second, construct validity indicates whether the obtained values are in line with expectations. Often, this is checked by looking at cost parameters; increasing the cost of an alternative should decrease the probability of choosing that alternative. In this study, this is true when looking at the attribute for delayed mowing, for example.

6. Conclusion

Agri-environmental schemes are the main tool for nature conservation in the EU, including in the Netherlands. In agri-environmental schemes, farmers voluntarily implement environmentally friendly measures on their fields, for which they receive a compensation. Dutch farmers can only participate collectively via their agricultural collective, which is a local partnership of farmers. Therefore, the collectives are central in the implementation of the Dutch agri-environmental schemes. Farmers can have various incentives to participate in agri-environmental schemes, such as financial as well as social rewards, flexibility, and help from others. Also, possessing knowledge about nature conservation and having intrinsic motivation play a role. Besides, the ease of integrating agri-environmental measures into the existing farm practices, the prevalence of species, and the visibility of measures and results can affect participation.

Currently, most of the agri-environmental schemes within the Common Agricultural Policy framework are action-based. In meadow bird management schemes this means that Dutch participating farmers receive payments based on the management measures they perform. On the one hand, this can ensure that every farmer can choose a suitable measure and have certainty of payment. On the other hand, action-based schemes can contain less flexible management measures, can prioritize measures rather than results, and can fail in positively influencing farmers' attitudes towards the environment. Due to these factors, action-based schemes can be ineffective in the long run regarding biodiversity conservation on agricultural lands. In theory, result-based schemes can be a promising alternative. This type of scheme directly links payments and environmental results, positively focuses on results instead of revenue losses and is less prescriptive. Despite these advantages, result-based schemes can be challenging to implement in practice due to the need for a feasible measurement method of results. That is the reason why many result-based schemes are hybrid schemes with both prescribed measures and result-based elements.

In this study, a discrete choice experiment was designed based on a hybrid result-based meadow bird scheme containing a fixed payment per hectare per year and individual and collective bonuses concerning environmental results. The discrete choice experiment was conducted with Dutch farmers engaged in meadow bird management. The results show that the average probability of accepting a hybrid result-based meadow bird scheme contract is 73.1%, indicating that a hybrid scheme can be attractive. The conditions that positively influence farmers' acceptance of a hybrid result-based scheme are i) a sufficient fixed payment per hectare per year, ii) the flexibility option to adjust the contract terms annually, iii) monitoring carried out by local experts rather than the public agency (NVWA), iv) less strict rules on fertilizer and pesticide use,

v) an individual bonus of €5000, vi) a collective bonus of €1000 and vii) a shorter delay in the mowing date.

Maintaining participation rates when mowing is longer delayed and/or stricter rules on fertilizer and pesticide use are in place would require a higher fixed payment, as is illustrated by the increased willingness to accept values associated with these conditions. These higher payments expected by farmers can be interpreted as compensation for higher nature engagement for the benefit of meadow birds. In contrast, farmers are willing to give up part of the fixed payment to have monitoring done by local experts, to experience flexibility, and to be offered an individual and collective bonus. This is reflected in the negative willingness to accept values regarding these conditions, which indicates that these amounts of fixed payments could be saved by the government. However, the fixed payment per hectare could also be kept at the same level as well as adding these conditions in a contract. In this way, farmers' participation rate in a hybrid result-based scheme contract could increase.

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Appendix

A1 *Survey*

1. Welcome

My name is Brechtje Silvius, and I am writing my master thesis on contracts for meadow bird management. An alternative to the current action-based management contracts is a result-based management contract. The precondition for success is broad support among managers. That is why your opinion is important! The question I am trying to answer with this survey is:

> *Would you be willing to participate in result-based meadow bird management and if so, under what conditions?*

I would really appreciate it if you would fill in this questionnaire. It takes about 20 minutes to complete. The answers will be processed anonymously, without being traceable to a person. Participation is not obligatory.

Please do not hesitate to contact us if you have any questions: brechtje.silvius@wur.nl

This survey is part of the EFFECT project of the European Union. For more information click here.

2. Part A: Choice experiment with hypothetical contracts

This questionnaire consists of part A - choice experiment and part B - background questions. You are now at part A.

Please read the following information carefully.

In this study, a hypothetical situation is sketched. Imagine that your current meadow bird management contract has expired and that you are about to make a choice for a new contract. On the following pages, you will be asked to choose between two contracts. You always have the option to choose neither.

The elements of the hypothetical contracts are shown below.

Contract elements

The following features will vary in the management contracts offered:

Payment per ha per year: *€500 per ha / €600 per ha / €700 per ha / €800 per ha*
To cover costs of quality loss due to delayed mowing.

Mowing date: *from June 1 / June 15 / July 1*
To receive payment, managers are expected to delay mowing.

Fertilizer & chemical weed control: *allowed / neither allowed / no fertilizer / no chemical pesticides*

In order to receive payment, it is expected that managers will comply with any restriction on the use of artificial fertilizer and/or chemical weed control.

An exception applies to local control of infestations of field thistle, common sorrel, Jacobean herb, and stinging nettle.

Monitoring: *Bird directors (and collective) / local bird protector / Nederlandse Voedsel- en Warenautoriteit (NVWA)*

Who is responsible for monitoring? Monitoring involves

- Reporting the number of hectares
- Supervision of management measures

Flexibility: *for farmer / for bird director / for both / for none*

There are two options for flexibility:

- For the manager: the contract can be adjusted annually
- For the manager: mowing can always be postponed according to the needs of the birds

Years: *2 / 6 / 10*

The number of years the contract is valid.

Individual bonus: *no bonus / €1000 per farmer / €5000 per farmer*

An annual bonus to managers who voluntarily implement the following two measures on part of the parcels under management:

- Ditch inundation between 15 February and 15 May
- Extensive grazing (max. 1.5 Livestock units/ha)

In any case, managers will receive an allowance of €1500 per ha of ditch inundation and €580 per ha for extensive grazing. **On top of this, the bonus is offered.**

Collective bonus: *no bonus / €500 per farmer / €1000 per farmer*

Annual bonus to each manager in a mosaic if the Gross Territorial Success (BTS) of this mosaic is higher than the average provincial BTS value of the same year.

3. Allocation of the questionnaire

Clicking on one of the options will take you to the next page. It does not matter which option you click.

Do you want to click on one of the following options?

- ☐ Choice experiment
- ☐ Choice experiment
- ☐ Choice experiment

4. Choice experiment [this is an example]

Below you are asked to choose between two hypothetical contracts. There is always the option to choose neither. In total, you will be asked to make a choice 6 or 7 times.

Would you like to see the description of the contract elements again before answering?

- ☐ Yes
- ☐ No

Which option do you prefer?

	Alternative 1	Alternative 2	Alternative 3
Fixed payment per year	€600/ha	€1000/ha	Neither of the alternatives
Mowing date	01.06	01.07	
Fertilizer & Pesticide Use	No bans	Bans on both	
Monitoring Measures and ha	Local bird protector	Bird director	
Flexibility for: Farmer: yearly adjustable contract Bird director: delay mowing to birds' needs	Farmer and bird director	No Flexibility	
Years	6	2	
Individual bonus For providing ditch inundation and extensive grazing on part of the plots. Comes on top of the compensation of €1,500/ha ditch inundation and €580/ha extensive grazing AND the fixed payment.	€5000/farmer	€1000/farmer	
Collective bonus For a higher BTS value of the mosaic than the average provincial BTS value	€500/farmer	No bonus	

- ☐ Alternative 1
- ☐ Alternative 2
- ☐ Alternative 3

If alternative 1 or 2 is chosen:

How many hectares would you enroll in this meadow bird scheme contract?

_____ ha

If alternative 1 or 2 is chosen:

Would you provide ditch inundation and extensive grazing in this meadow bird scheme contract?

- ☐ Yes
- ☐ No

5. Part B: Background questions

You are almost finished.

When are you born? _____

What is your gender?

- ☐ Man
- ☐ Woman
- ☐ Other

What is your level of education?

- ☐ Lower school
- ☐ Middle school
- ☐ Mbo
- ☐ Hbo
- ☐ University

What is the size of your household? _____

Since when are you a farmer? _____

I run my farm business

- ☐ Fulltime
- ☐ Parttime

My farm consists of _____ ha land, under which _____ is permanent pasture

My farm is

- ☐ Conventional
- ☐ Organic

Which collective are you a member of?

- ☐ NFW
- ☐ Westergo
- ☐ It lege midden
- ☐ Súdwestkust
- ☐ Other _____
- ☐ N.a.

Is your farm primarily a dairy farm?

- ☐ Yes
- ☐ No

How many dairy cattle do you have? _____

How many kilograms of milk have you produced in 2021? _____

When was your first mowing date in 2021? _____

My farm is mainly on the soil type:

- ☐ Sand
- ☐ Peat
- ☐ Clay

Do you participate in meadow bird management?

- ☐ Yes
- ☐ No

How many hectares are enrolled in meadow bird management? _____

What measures do you perform?

- ☐ *Clutch management*
- ☐ *Grassland with resting period*
- ☐ *Chick fields*
- ☐ *Herb-rich grassland*
- ☐ *Extensive grazing*
- ☐ *Rough manure*
- ☐ *Raise the water level*
- ☐ *Ditch inundation*
- ☐ *N.a.*
- ☐ *Other:* _____

Do you think you would manage more meadow birds if neighbors would also participate?

- ☐ Yes
- ☐ No

Are you satisfied with your current meadow bird scheme contract?

- ☐ Very satisfied
- ☐ Satisfied
- ☐ Neutral
- ☐ Dissatisfied
- ☐ Very dissatisfied
- ☐ I don't know
- ☐ N.a.

Do you prefer meadow bird scheme contracts based on actions or results?

- ☐ Actions
- ☐ Results
- ☐ I don't know
- ☐ N.a.

How many meadow bird nests did you manage in 2021?

- ☐ 0-25
- ☐ 26-50
- ☐ 51-75

- ☐ 76-100
- ☐ 202-125
- ☐ 126+
- ☐ I don't know
- ☐ N.a.

How difficult do you think it is to manage meadow birds? 1 = not difficult at all, 5 = very difficult

1 2 3 4 5

How do you assess your knowledge about meadow bird management? 1 = very little, 2 = very much

1 2 3 4 5

How do you assess the current financial position of your farm business?

- ☐ Very healthy, room for investments
- ☐ Healthy, sufficient reserves
- ☐ Profitable, but considerable debt
- ☐ Variable profitability, high indebtedness
- ☐ Structurally loss-making

I dare NOT to take more risks than my farmer colleagues

1 2 3 4 5

If you want to have success, you must avoid taking risks

1 2 3 4 5

New methods of working must first prove themselves before I will apply them

1 2 3 4 5

How important are the following aspects in your farming business? Please rank the aspects, dividing 100% among the three aspects according to their importance. (0% = not at all important, 100% = most important)

- Maximising profit _____
- Achieving financial stability _____
- Minimising impact on the environment _____

Now imagine that your income decreases with 10%. How important are the following aspects in your farming business? Please rank the aspects, dividing 100% among the three aspects according to their importance. (0% = not at all important, 100% = most important)

- Maximising profit _____
- Achieving financial stability _____
- Minimising impact on the environment _____

Do you have notes? _____

A2 *Agricultural collectives and respondents*

Agricultural collective	**Respondents**
Noardlike Fryske Wâlden	57
It lege midden	14
Súdwestkust	2
Rijn, Vecht en Venen	5
Collectief Midden-Groningen	2
Unknown	14
Total	94

A3 Summary of additional questions after each choice set

Additional questions after choice set	**Mean**	**Obs**
IF one of the two contracts is chosen:		
How many hectares are you willing to enroll in the chosen contract?	12.822	386[a]
Are you willing to provide both ditch inundation and extensive grazing?	0.721	283[b]

[a)] Observations based on specifications of enrolled hectares if a contract is chosen by a farmer

[b)] Observations based on specifications of provision of measures if a contract is chosen by a farmer and if an individual bonus is offered