Grain planting progress report: The potential benefits for the South African grain industry

by

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Degree MSc (Agric) Agricultural Economics

in the

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DECLARATION

I, Ikageng Martha Maluleke, hereby declare that this dissertation submitted in partial fulfilment of the degree MSc (Agric) Agricultural Economics at the University of Pretoria is my own work and has not been submitted for a degree at any other tertiary institution.

Signature…………………………..

Date: February 2017

DEDICATION

This thesis is a dedication to my late uncle, Tau Duncan Ratlabala. Thank you for your love, support and guidance. I wish you were here to see me now; may your soul rest in peace.

Proverbs 3 verse 5: To the almighty God, this would not have been possible without you. Thank you for being a faithful and merciful God; my strength and wisdom come from you. Thank you for blessing me with such amazing people as my support system, may you continue to shine your face upon each of them.

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To all my beloved friends and extended family, thank you for always having my back, for your prayers and supporting me throughout.

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ABSTRACT

The grain and oil seed industry plays a major role in the South African economy; therefore, having access to market information is vital for this market to remain efficient and competitive. A shortage in market information causes many inefficiencies and uncertainties. Having market information allows the playing field to be level for all role players and reduces opportunities for manipulating prices. South Africa, just like most developing countries, needs to strengthen information flows, as well as institutions governing the grain and oil seed industry. In view of the major grain producing countries in the world and the amount of money and effort spent on releasing planting progress reports, the South Africa grain and oilseed sector should to take heed.

This paper considers the importance of market information and how the South African grain and oil seed industry can benefit from that, grain planting progress reports are considered to be of importance as they fill a significant gap in the production season. Taking an institutional perspective into the economics of information, the study found that actors having little financial and social resources or political influence faced high costs in accessing information and that this prevents both market development and access to existing ones. The point of discussion is on weak information flows, as well as transaction costs that come with them, and the impact they have on prices and profitability. We therefore use New Institutional Economics to emphasise the importance of information in the market and the impact thereof in the absence of perfect information. The main underlying issue for imperfect information is that the lack of perfect and freely available information leads to risk and uncertainty in transactions.

When trying to analyse the importance of information in the grain and oilseed industry, it was established that accuracy, value and market effect of information for public consumption were important. In particular, information communication technology was examined as a means of information dissemination in agriculture, especially in developing countries like South Africa. The study found that the major grain and oilseed producing countries that generate planting progress reports are the USA, Brazil, Argentina and Australia. The study looked at the methods used by these countries to compile such reports. Although they have varying methodologies, the key point is timely and frequent information which is readily available for public consumption.

After analysing developments and methodologies globally, the focus shifted to South Africa where current information sources in the South African grain and oilseed industry, and the kind of information provided, were analysed. A pilot study was conducted in the summer grain production area of NWK Ltd to gain some insight and experience. The source of communication comprised mobile phones and farmers were able to respond on their progress, as well as receive feedback using the same communication media. Lastly in order to re-emphasis the benefits of a planting progress report, we review the impact of price volatility and how information in the market can help stabilise it.

Key words: Planting progress, Crop reports, value of information, market price impact.

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LIST OF ACRONYMS

ARC	Agricultural Research Council
ASB	Agricultural Statistics Board
CEC	Crop Estimate Committee
CPP	Crop Planting Progress
DAFF	Department of Agriculture Forestry and Fisheries
DoA	Department of Agriculture
FAS	Foreign Agricultural Services
ICT	Information and Communication Technology
MTSF	Medium Term Strategic Frame Work
NAMC	National Marketing Council
NDA	National Department of Agriculture
NASS	National Agricultural Statistics Services
NDA	National Department of Agriculture
NOAA	National Oceanic and Atmospheric Administration.
NWK	The former "Noordwes Kooperasie".
SAFEX	South African Futures Exchange
WASDE	World Agricultural Supply and Demand Estimates.
USDA	United States Department of Agriculture.

CHAPTER 1

INTRODUCTION TO THE STUDY

The grain and oilseed industry is of great importance to the South African economy. Over the past few years, the South African grain industry has been facing three major challenges: skewed participation, constrained competitiveness and profitability, and food insecurity (NDA, 2005). Adequate market information is one of the key contributing factors for reducing uncertainty and creating a favourable environment within which to operate. According to Kirsten *et al* (2009), African agricultural development faces technical and institutional challenges due to several contributors; however, for this study, we will focus on thin markets which contribute to, and are a result of, a business market generally characterised by weak information, lack of contract enforcement, and high risk in transaction costs. The objective of this study is to demonstrate the importance of planting progress reports as a source of market information in the grain and oilseed industry of South Africa. By way of background, this study looks at attempts by government to ascertain where inefficiencies in the market are and how they can be resolved. This study also identifies a gap which exists in the production calendar which has not yet been filled. This is the lack of adequate information in the market at the appropriate time in the season, which could be addressed through a planting progress report.

1.1 Background

It has been observed that several countries around the world compile a grain 'planting progress report' at the commencement of the planting season. Such a report, on a weekly basis, expresses as a percentage the number of hectares planted compared with the planting intentions. Needless to say, the report is only compiled over the planting season, which in South Africa is normally approximately 10–12 weeks, from east to west in the case of maize. The most well-known category of these reports comprises the United States Department of Agriculture (USDA) reports that have been published for over 50 years. Countries like Argentina and Brazil are also releasing similar reports and/or statistics. Sometimes, non-government institutions or large private research companies release related reports of their own. At present, the South African grain industry does not publish any comparable report. This pertains to the government, organised agriculture and private research institutions.

The grain and oil seed industry is an important contributor to the South African economy. This industry makes R10 billion yearly and contributes about 3 % to the GDP (DAFF, 2015). The role players involved in the industry include farmers, traders, millers, and exporters. This industry employs as many as 4 million people in the different facets (DAFF, 2015). There is production of around 12 million tons of maize, 1.8 million tons of wheat, 600 000 tons of sunflower, and 900 000 tons of soya beans, yearly (DAFF, 2015). The industry plays an important role in providing sufficient quantities of grain which is needed for basic staple requirements for the country, as well as animal feed, and therefore government has an interest in ensuring that the industry is competitive and viable (NDA, 2005). There has been a momentous movement of prices in the past couple of years; in maize, wheat and soybeans, both in local and international markets, presumably because of weather conditions and exchange rates, as well as asymmetric information in the market.

Focusing on the issue of information asymmetry in the grain and oilseed industry, and trying to deal with the issue of transparency, a recommendation made in the National Marketing Council (NAMC) 2008 Report was to look at ways where information and access to information can be improved, as well as achieving an increase in transparency. Three major issues where addressed by the NAMC 2008 Report after a request from Grain SA: firstly, the role of speculators in trading and the possible influence of speculators on price fluctuations; secondly, the volatility of grain prices; and thirdly, the effect of external factors, such as the publication by the National Crop Estimate Committee of producers' intentions to plant, on the volatility of the South African Derivatives Market known as South African Futures Exchange (SAFEX) grain prices (NAMC, 2009).

In 2003, under the former National Department of Agriculture (DoA), now the Department of Agriculture Forestry and Fisheries, the former Minister, Ms Thoko Didiza, requested a team of individuals to look into price volatility issues and consequently a Food and Price Monitoring Committee was formed (NDA, 2005). The recommendations of the committee were as follows: firstly, information had to be more accessible and there needs to be readily available information on rainfall patterns and weather. Secondly, there needs to be regular reporting on actual rainfall in grain producing areas to prevent weather and crop predictions unduly influencing prices in the future. Finally, it was further emphasised that the lack of proper market information had played a significant role in the manipulation of the market in 2002.

The above-mentioned recommendations furthermore came to be relevant when the National Agricultural Marketing Council (NAMC), on behalf of Grain SA, investigated reasons for price volatility in grains (NAMC, 2009). In addition, the USDA has been said to play a large role in distributing and monitoring market information: commodity markets worldwide rely on USDA reports for guidance on international supply and demand conditions, and part of those reports includes the planting progress/conditions report (NAMC, 2009).

Table 1.1 below indicates the recent medium-term strategic framework (MTSF) of DAFF and how they plan on achieving its objectives. The aims of the programme are to enhance sustainable use and to achieve economic growth, food security, rural development and transformation (DAFF, 2011). Through these deliverables, it is clear that market information is of great importance and that government is endeavouring by all means to come up with strategies that promote information availability.

Table 1.1: DAFF MTSF programme deliverables

Strategic objective	Strategic outcome	Outcome indicators	Strategic interventions 2011/12–2014/15
Strategic goal 6: Effective and efficient governance			
SO 2: Strengthen policy, planning, monitoring, evaluation, reporting and sector information	Comprehensive economic and statistical information for the agriculture, forestry and fisheries sector	Adequate information available for decision making purposes	Economic performance monitoring and provision of national sector statistics

Source: *DAFF*, 2011

1.2 Problem statement

According to economic theory, competitive markets are classified as those with perfect information and where prices are determined by supply and demand, but regrettably, this is not the case for the grain and oilseed market in South Africa. This consequently causes much opportunistic behaviour by speculators and other role players in attempts to manipulate prices to their advantage. Transparency in markets is important and as a result, the grain industry requires a platform to keep all role players abreast of the latest developments. Some reports are already being published, but they are inadequate to cover the entire production calendar and so there is still room for opportunistic behaviour in the industry. A planting progress report will address some of the important needs for more frequent market information, especially between pre- and post-harvest information that is currently available.

1.3 Purpose statement

The purpose of this study is to not only analyse why other countries, specifically including the USA, are publishing such a planting progress report, but to also consider the report as an invaluable piece of information for market participants and for the efficient functioning of the market. Subsequently, South Africa's own circumstances will be compared, making a case for why South Africa could also benefit from such a report.

1.4 Research objectives

The objective of this research will be to determine which countries compile such reports, how they compile the reports, and the benefits thereof. Secondly, whether such a report could be compiled in South Africa, and what methodology the compilation of the report should follow. A pilot study was conducted in the summer grain production area of NWK Ltd where insight and experience were gained. The final objective of this study will be to determine the benefits of such a report for the South African industry.

1.5 Hypothesis

The study will be divided into two main components, namely the international practices and the local opportunities. The focus will be on the latter. In this context, there will be two hypotheses:

- Leading grain and oilseed producing countries benefit from the publication of a planting progress report.
- The South African grain and oilseed industry will benefit from the publication of a planting progress report.

1.6 Academic value and contribution of the proposed study

If successful, this study could re-open the debate for the need for a planting progress report in South Africa. It will serve as proof of why such a report is valuable and the contribution it can make in a transparent, efficient and free trading environment. It could lead to policy changes and funding being generated for such a report.

The key to maintaining a successful competitive market policy for agriculture is transparency. A successful competitive market needs many different types of information, for example crop estimates, harvesting/delivery statistics, and import and export statistics. Planting progress statistics and information also fall into this category.

A competitive market constantly reacts to the latest information. This will drive prices higher or lower, depending on other aspects such as stock levels and supply and demand (Heifner & Kinoshita, 1994). It is therefore also critical that all market players have an equal opportunity to share in accurate information. What producers and agribusinesses do not want are rumours going around, driving prices higher or lower, but for the wrong reasons. This means that at times, procurement will be done at prices above the economic value, to the detriment of processing companies, and at other times, sales will take place below the economic value and to the detriment of the producer. Both parties are there for the long run and prefer a stable business environment where product values continuously reflect a more balanced and realistic market price. Any deviation of market prices or ‘price scares’ should be quickly corrected with updated and factual, reliable information.

1.7 Methodology and framework

Market information is vital to the functioning of grain and oilseed markets, as this allows role players to plan and create strategies to protect them from any potential risk. Market information is a good means for reducing opportunistic behaviour, where the powerful role players are able to corner the market. This study aims to show the importance of adding another report to the grain and oilseed market, which specifically shows the development and growth of crops on a weekly basis throughout the whole season, as compared with the planting intentions.

This is a qualitative study, and thus the following will be done in order to reach the objectives. Firstly, an in-depth literature review will be undertaken in order to look at the importance of these reports. The benefits are quite comprehensive, especially in the USA as it is the leader in market information reports, and therefore this study has subdivided the literature review into different sections and analysed the accuracy, value, and market effects, as well as informational aspect, of the reports. This study also looked at information communication technology as a cost effective means to disseminate information in the agricultural sector.

Secondly, this study looks into international practices and, once again, the USA comes under the microscope, where the different reports that the USDA produces in every season are analysed, together with the procedures for compiling crop progress (CP) reports and survey and estimation procedures, as well as their revision policy. Thirdly, we look into the benefits of CP reports, where an in-depth look is taken into the different studies done on the effects and benefits of the reports.

Fourthly, we look into the South African grain and oil seed industry and give an overview of the current market information available, as well as the need for more information on the market. Lastly, a pilot study that was done with participants from the NWK Ltd is analysed to better understand the market and the willingness of respondents to participate. This also serves as an opportunity to ascertain whether the current crop estimates or the USDA methodology is suitable, and then adjustments can be made accordingly.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The first section of this literature review takes an institutional economics' perspective on the economics of information. The second section puts emphasis on the effects of planting date on yields. The third section is based on USDA reports and is structured in the following way: accuracy of reports is discussed; the value of reports to the market; the market effects of reports; the market information provided by these reports; costs and alternatives; and finally, the methods used to compile reports. The last part highlights the importance of Information Communication Technology (ITC) in agricultural information dissemination.

2.2 Institutional Economics perspective

According to Dorward, Kydd and Poulton (2005a:3, cited in Kirsten *et al*, 2009), one of the key arguments from institutional and economic development study of low-income countries is that they are characterised by high transactional costs, risks, weak information flows, and weak institutional environments. Actors having little financial and social resources or political influence faced high costs in accessing information and this prevents both market development and access to existing markets. Although the above is somewhat descriptive of South African agriculture, it can be said that most issues have been overcome through institutions such as the commodities derivatives exchange (SAFEX). Contracts are enforced, but it is not always the case that prices reflect all available information. The point of discussion in the study will be focused on the weak information flows, as well as transaction costs that come with them, and the impact they have on prices and profitability. The particular focus of New Institutional Economics (NIE) is the importance brought into view that economic actors face problems as a result of imperfect information in transactions, together with the institutional role in addressing such issues (Kirsten *et al*, 2009). This study will therefore use NIE to emphasise the importance of information in the market and the impact thereof.

One of the core assumptions of the perfect competition model is that there exists perfect information in the market, where economic actors have comprehensive information about all aspects of business profits and consumption utility, including market opportunities, available technology, costs of production under alternative production arrangements, prices, natural resources, quality of goods produced, and most critically, the intentions of fellow actors (Kirsten *et al*, 2009). However, the point of contention is that the perfect competition model does not exist, because this does not reflect the real world economy.

A suggestion brought about by the work of Hayek (1945) mentions that in an economic environment, economic actors never possess all relevant information or complete knowledge of the means available to make economic decisions. This results in information asymmetries, generating moral hazard problems and adverse selection. Furthermore, information asymmetries generate contract enforcement issues, because compliance with contracts becomes hard to verify by external agents such as courts (Fafchamps, 2004). Therefore, the presence of opportunistic behaviour and information asymmetry necessitates the formation of institutions for contract enforcement in the market, without which market transactions would not be possible.

2.2.1 The economics of imperfect information

The main underlying issue of imperfect information is brought about by risk and uncertainty attributable to the lack of perfect and freely available information on the market (Kirsten *et al*, 2009). It is said by Kirsten *et al* (2009) that information is incomplete and asymmetrical in that sellers have more information than buyers do, or vice versa, in relation to product supply and demand: the search for information about products and buyers and sellers is therefore important for both parties, respectively, as it helps to reduce the risks of transaction failure. However, the search comes at a cost, which is an important source of transaction costs.

According to Grossman and Stiglitz (1980), imperfect information leads to substantial transaction costs in most forms of economic activity and it has a profound consequence for welfare and development and management policy. Equilibrium can only be reached if you have competitive markets that are not impeded by transaction costs that hamper exchange (Kirsten *et al*, 2009). Imperfect information causes difficulties in market transactions; however, the difficulties have varying degrees according to different situations. These difficulties will vary with the nature of the product or service being exchanged; the institutions governing the transaction; the nature and extent of investments in the transaction; the characteristics of transacting parties (for example, their power, wealth, risk aversion, and access to information); and the characteristics of the economy, sector, and society of the transacting parties (Akerlof, 1970).

2.3 USDA Reports

Correct and accurate data about the situation and outlook for agricultural commodities improves efficiency of production and the marketing chain, thus helping farmers, ranches, agribusinesses and government to make decisions (USDA, 2012). For over 150 years, the USDA has been in existence, serving an important function in the market place. The playing field is levelled for producers and merchants, as well as consumers of agricultural commodities, whenever there is availability of data for crop conditions, supply forecasts, and trade and inventory levels because informational disparities are reduced. It has been indicated by Isengildina-Massa *et al* (2006) and Lehecka (2013) that USDA reports have a greater influence on the market during times of uncertainty and this outcome is of importance, considering the recent instability in agricultural markets.

2.3.1 Accuracy

Egelkraut *et al* (2003) compared USDA corn and soybean production forecasts with those of private forecasting agencies. It can be said that, in general, the USDA provides superior estimates and superior corn and soybean estimates during harvest season. It was found that the gap between private agencies and the USDA is narrowing, as private agencies do better at August soybean forecasting.

When comparing various university-based extension estimates with USDA production forecasts, Kastens, Schroeder and Plain (1998) found that USDA forecasts are more accurate for supply utilisation, market-year average price of crops, and broiler and egg production prices.

Isengildina-Massa *et al* (2006) observed that the accuracy of World Agricultural Supply and Demand Estimates (WASDE) reports might have improved over time; however, according to Egelkraut *et al* (2003) and Botto *et al* (2006), after examining the accuracy of WASDE forecasts, no consistent improvement was found to be evident, thus casting doubt on the interpretation.

2.3.2 Value

Bullock (1976) considered ways of improving the value of USDA farm-level data reports to farmers. His results showed that better forecasts are preferred to worse ones, but there is not much value in improving the accuracy of forecasts because the market depends most on the present demand and supply conditions. He further pointed out that the frequency of forecasts is the most important factor in improving the informational value of USDA production forecasts.

Fama (1970) illustrated that new information is followed by price adjustments only if the information is unexpected or opposed to what traders believed. A study that was done on the USDA's WASDE reports calculated the value of information as the difference in commodity price before and after the report was released, which revealed the following outcome: although there were many contributing factors, they were able to isolate economically meaningful market reactions to WASDE reports, the effects were seen in changes for soybean and wheat contracts of about $1.90 and $1.40 per ton, respectively. Considering the entire market and the number of contracts held, this has a significant impact (USDA, 2012). McNew and Espinosa (1994) concluded that USDA crop reports have an economic value, after ascertaining that the reports significantly influence the uncertainty present in the market.

Sharif (2009), wrote on maximising the value of public sector information (PSI), and he highlighted how important PSI is to different communities: government can use this resource for making policy and promoting transparency and accountability, and the private sector can use it to produce innovative products which will contribute to the national economy. Civil society requires PSI as a resource for dealing with poverty reduction and other socio-economic problems, which has significant economic effects (Allen 1994). Finally, for citizens, PSI is essential for exerting their civic rights and enables democratic participation.

Irwin, Good and Gomez (2001), determined the value of USDA outlook information, and concluded that this information reduces the uncertainty of market participants' expectation of distribution of futures prices, which reduction in market uncertainty was said to be unambiguously welfare enhancing.

2.3.3 Market effect

According to Lehecka (2013), a change in the expectations of market participants is reflected by price movements in the market place, which is an indication that new crop progress and condition information changes supply perceptions of participants. CP reports containing crop progress and condition information have a greater effect than just the crop progress information; however, the implication is not that the crop progress information is without value, because there is a combined effect. The analysis implies that prices react quickly and in the indicated direction, particularly due to changes in condition information contained in CP reports. Finally, it was established that whenever uncertainty about future market conditions is higher, there is a higher reaction to the CP report and condition information.

2.3.4 Market information

When examining decision-making behaviour, it can be observed that most participants rely on sources of information to enhance the value of their decisions (Gorham, 1978). The USDA provides the most public information in the world, covering a variety of variables of interest to the public, and this information is used by farmers, merchants and other market participants. Market information is not only provided by public sector, and there is also a gap that can be filled by the private sector in terms of complementary information on price movements, and advice on which positions market participants should take, as well as filling an analysis gap (Gorham, 1978).

During their study on the social value to public information, Morris and Shin (2002) found that public information has attributes that make it both favourable and unfavourable for public policy in that this instrument can be effective for influencing the actions of agents, whose actions are strategic complements, and the problem is that it is too effective in doing so. It is found that agents tend to overreact to public information and hence any unwarranted public news or mistaken disclosure may cause great damage. Hayami and Peterson (1970) established that social returns exceed the cost of data collection over an extremely wide margin, and this is even after adjusting for over-estimation arising from errors in demand and supply elasticities.

According to Gracia *et al* (1997), the conclusion of the tests that were conducted on the USDA corn and soybean forecasts came out as follows: the price reaction test suggested that unanticipated components of the USDA forecasts significantly affect futures prices, and that the willingness to pay suggested that advanced knowledge of USDA corn and soybean forecasts would allow traders to correctly position themselves in futures markets, therefore showing that traders would be willing to pay for advanced information.

Hayami and Peterson (1970) developed two models for estimating the social returns to improvement of information and it was found that social returns exceed the cost of data collection over an extremely wide margin, even after adjusting for over-estimation from possible errors in supply and demand elasticities. It was also suggested that there is an underinvestment in provision of public information, especially in statistical reporting for agricultural production. The results indicated that social returns to a dollar invested in statistical information services are comparable with returns in such high pay-off investments as agricultural research.

2.3.5 Costs and Alternatives

It was stated by Hayami and Peterson (1972, cited in C-FARE, 2013) that in order to acquire data, you need to incur costs related to sample size, survey length and mode, as well as desired response rate. It was demonstrated that as much as the value of data increases with precision, so do the costs, therefore indicating that there is a trade-off between precision, information value and cost. Isengildina-Massa (2013) suggested that if marginal costs of data collection and dissemination in each periodic release of data may not be large, then less frequent releases should be considered, which might be cost saving without significant loss in value.

C-FARE (2013) also considered less expensive ways of data collection, as opposed to surveying which is very costly: satellite imaging and remote sensing can provide information on crop planting and yield. In the same study, Garllardo, Brorson and Lusk (2010) further contribute the view that specially designed prediction markets can be used in deriving estimates of information contained in commodity reports.

2.3.6 Methods

As has already been conveyed by Gorham (1978), valuable information in the market is expected to move prices. Dummy variables are usually used to denote new information for announcement days, and measures of unanticipated information and market reaction are denoted by using measures of conditional or unconditional volatility from options markets or volume (Isengildina-Massa, 2013). When undertaking an event study, one can compare mean-variance-covariance or even distribution of futures returns on event days in comparison with non-event days; using both parametric and non-parametric tests (Isengildina-Massa, 2013).

Hayami and Peterson (1970) captured social returns to public information services by developing two models; an inventory adjustment model and a production adjustment model. The production adjustment model assumes that producers adjust their output along their supply schedule in response to changes in their price expectations; it is also assumed that price changes come about as a result of new information on expected output provided by statistical reporting agencies.

When determining the informational value of USDA Reports, Gracia *et al* (1997) used three tests of informational content: Firstly, a relative forecast accuracy test, where a measure of the market supply variance before announcement must first be estimated. Secondly, a price reaction test which is based on efficient market hypothesis (EMH), where prices reflect all available information (Fama, 1970); and finally, a willingness to pay test, where the basic approach behind the test is that private futures traders would be willing to pay for the forecast before it becomes publicly available.

2.4 The use of ICT in agriculture to aid in information dissemination

This section emphasises the importance of information in an efficient market. We get to understand the role played by information in making the grain and oilseed market more transparent and how participants need timely and accurate information. This includes how prices transmit information and how it should be packaged to aid in better decision making. The past few decades have witnessed an increase in mobile phone usage, and we examine the significance of mobile phones in information dissemination, especially in developing countries. Furthermore, we see their potential in cost effectively disseminating information. The use of ICT, and specifically mobile phones, will again be discussed in Chapter 5, as mobile phones were used for pilot study.

Kalusopa (2005) presented the idea that market information should have three functions: knowledge acquisition, decision making, and providing communication between stakeholders. Price and market signals are the key instruments facilitating coordination issues involved in the allocation of resources to the best possible use. Prices transmit all information that participants require to make effective decisions on both the supply side and the consumption side (Abraham, 2006). However, prices are sensitive to information in the market, which makes it important to have access to timely and accurate market information. McMillan (2002) studied the subject of the free flow of information through markets: "information is the lifeblood of markets. A market works badly if information does not flow through it. Rarely does information flow absolutely freely, but well-functioning markets have mechanisms to aid its movement." It was observed by Abraham (2006) that poorly functional markets that are characterised by poor internal flows are predominant in most developing countries, and there it is expected that there will be uneven distribution of information, which hinders negotiations and often limits contractual agreements. Transaction costs are often kept in check in well-designed markets; however, if price mechanisms do not work, large parts of the market remains ignorant of crucial market information; making the cost of acquiring information higher, and the time to react to new information slower (Abraham, 2006).

Effective use of information requires systematic collection, organisation and repackaging for the supply of consumers, as and when needed. Consumers would like information to be easily accessible and current; this process can be enhanced by Information Communication Technology (ICT). According to Kalusopa (2005), in the grain and oilseed industry, ICT can bring new information resources and open new communication avenues for all stakeholders. Results of a study done by Ali and Kumar (2010) indicated that the decision-making process among farming communities is likely to improve as a result of provisions of information and knowledge through ICT. For the purpose of this study, we will look at mobile telephone devices as a means of collecting and disseminating information.

For over two decades, mobile coverage has spread rapidly in Africa, with over 60 % (figure 2.1)of the population in sub-Saharan Africa having access to mobile phones by 2009 (International Telecommunication Union, 2010). Although it started with the wealthier urban population, it has been observed that an increasing number the rural poor have access to mobile phones, and this reduces the cost of communication and information acquisition (Aker, 2011). Access to mobile phones per 100 people (figure 2.2) in developing countries often surpasses other information technologies, such as landlines (Jensen, 2009), newspapers, and radios (Aker & Mbiti, 2010). Farmers require information on a variety of topics at each stage of the production process and in many developing countries such information is shared personally through extension officers, radio, newspapers and landlines. Compared with these mechanisms, mobile phones can significantly reduce the costs of obtaining agricultural information (Aker, 2011).Furthermore it is observed that once people have adopted means of communication, they are more prone to be receptive to new technological advancements, Figure 2.3 shows a representation and growth of from 2G[1] to 3G from 2005-2010, throughout the globe.

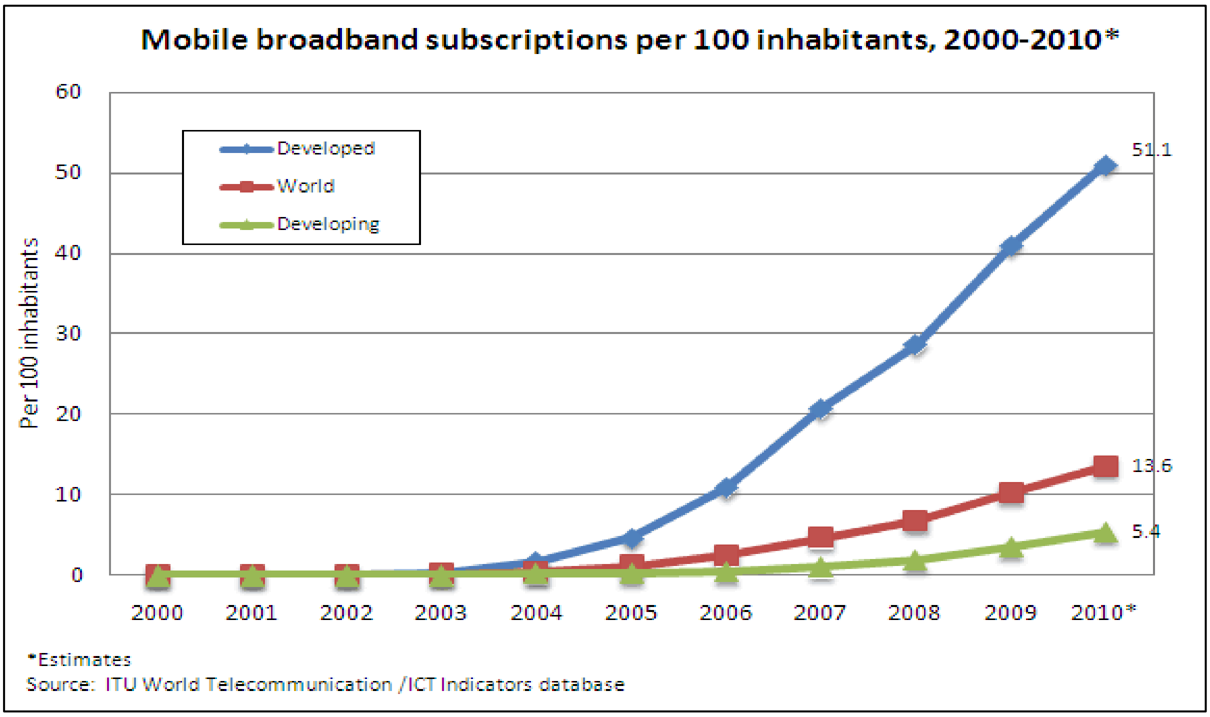

Figure 2.1: Mobile broadband subscription per 100 inhabitants, 2000-2010

Source: *International Telecommunication Union*, 2010

[1] According to (Techwelkin, 2015) the letter G stands for General packet Radio Service (GPRS). It indicates the speed of internet data transfer. The number before the G indicates how advanced the internet transfer is, e.g. Second and third generation (Techwelkin. 2015).

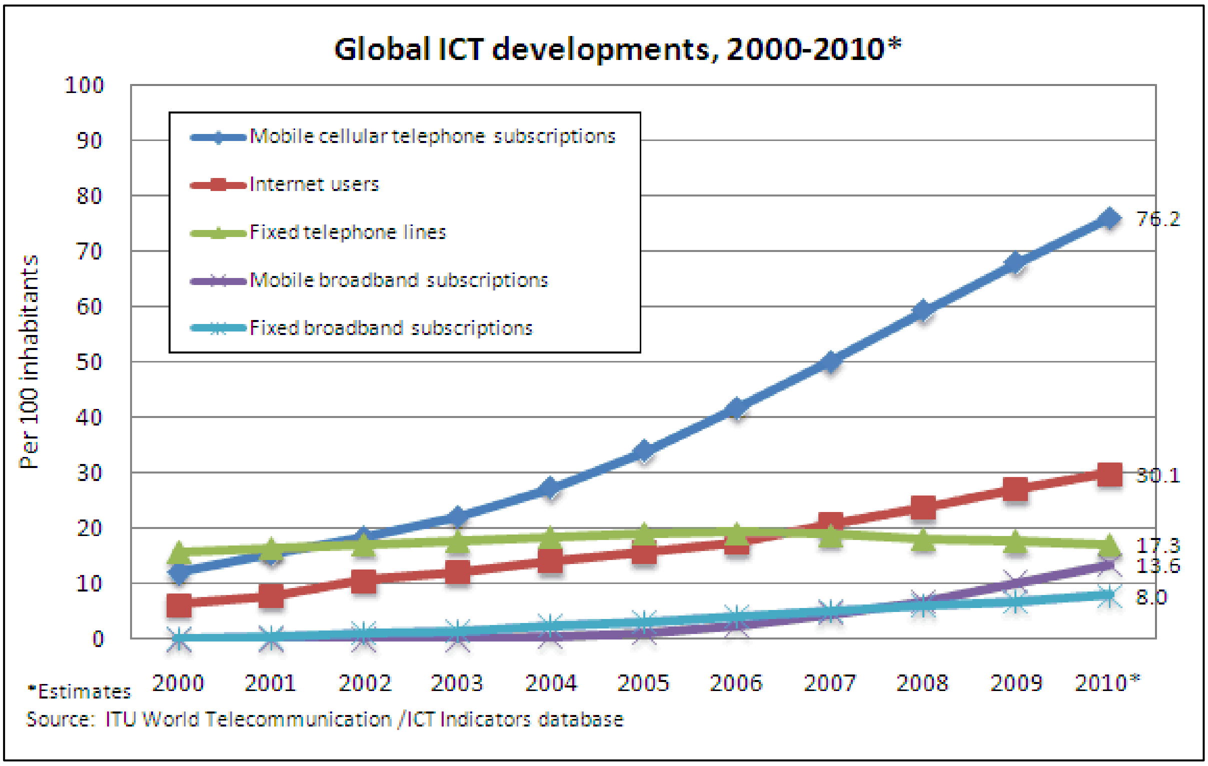

Figure 2.2: Global ICT developments

Source: *International Telecommunication Union*, 2010

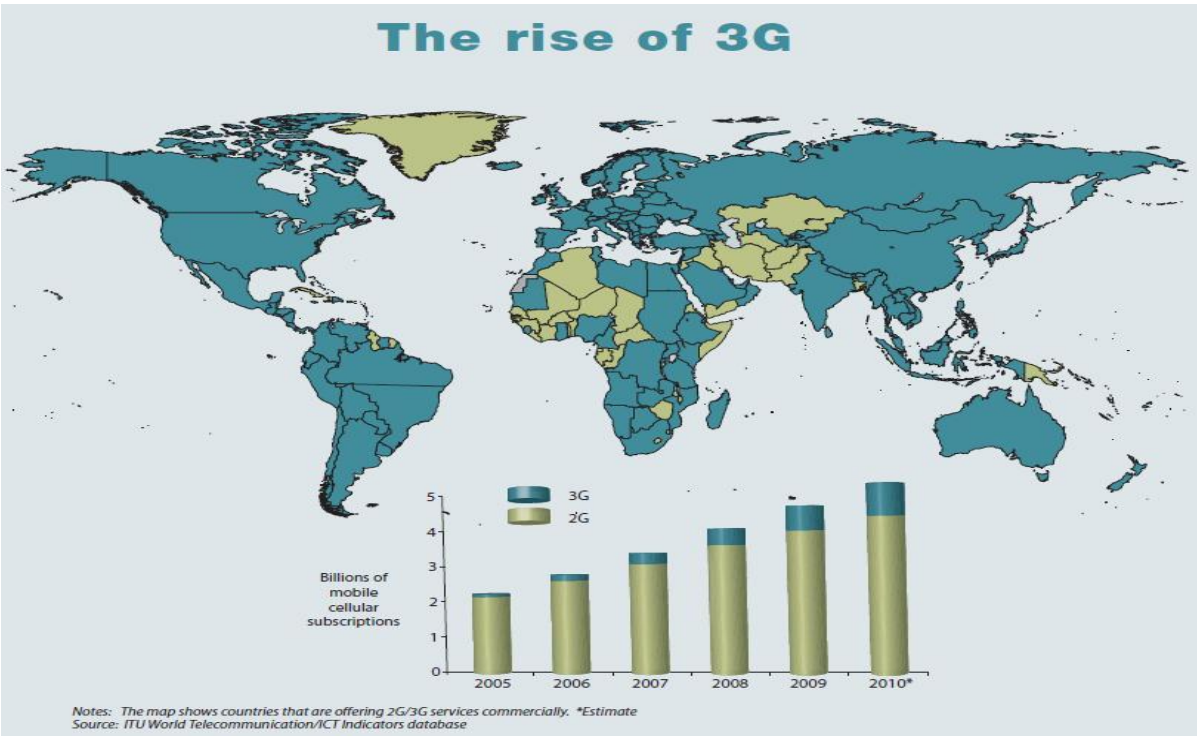

Figure 2.3: Shows countries all over the world offering 2G and 3G services

Source: *International Telecommunication Union*, 2010

2.5 Summary

To recap, this chapter focused on understanding the economics of information asymmetry, where we took an institutional economics perspective. It is understood that imperfect information leads to substantial transaction costs, which leads to profound consequences on welfare, development and management policy. This also has a major impact on competitiveness, thus depriving decision makers of the opportunity to make effective and well-informed decisions.

The USDA has produced various agricultural reports for decades; this leads to the assumption of their importance and necessity. Looking into the various reports, the following was established:

- Accuracy: Correct and accurate data about the situation and outlook for agricultural commodities improves efficiency of production and the marketing chain, helping stakeholders to make better decisions.
- Value: it was concluded that this information reduces the uncertainty of market participants' expectation of distribution of futures prices, which reduction in market uncertainty was said to be unambiguously welfare enhancing.
- Market effect: According to Lehecka (2013), a change in the expectations of market participants is reflected by price movements in the market place, which is an indication that new crop progress and condition information changes supply perceptions of participants. Finally, it was established that whenever uncertainty about future market conditions is higher, there is a higher reaction to the CP report and condition information.
- Market information: When examining decision-making behaviour, it can be observed that most participants rely on sources of information to enhance the value of their decisions (Gorham, 1978).
- Costs and alternatives: over the years, less expensive ways of data collection, as opposed to surveying which is very costly, have been established, although not as widespread, but this is becoming a trend.
- Methods: It is assumed that price changes come about as a result of new information on expected output provided by statistical reporting agencies. The basic concept behind most methodologies is to determine the difference in between price movement

on days where there is new information, and on days when there is no new information.

Finally, we looked at the use of ICT in agriculture as a source of information dissemination. With the ICT becoming increasingly more widespread in developing countries, it has provided new platforms for communication, as well as for conducting surveys in rural areas. These new platforms, like mobile phones, create cost-effectives ways for transmitting information.

CHAPTER 3

INTERNATIONAL PRACTICES FOR PLANTING PROGRESS REPORTS

3.1 Introduction

The aim of this section is to determine which countries compile planting progress or similar reports, and the methodology they use. Several countries in the world produce planting progress reports. In this section, we will look at some of the major grain and oilseed producing countries (e.g. Argentina, Argentina, Brazil, and USA) and the rest of the world. Moreover, it should be noted that Argentina, Australia and Brazil do not have as much available information as the USA does; hence it forms the backbone of this study. Other major grain and oil seed producing countries were identified however they do not produce planting progress reports (e.g. China, India, Russia and France).

3.2 Argentina

Argentina, one of the leading producers in South America, has made great strides in providing valuable information to their producers. Raw data is processed to the point where a map is provided which visually indicates planting progress, as depicted in Figure 3.1 below. This will then be accompanied by some kind of explanation, such as the percentage of recorded anticipated hectares that have been planted at a certain point, compared with the year before. They also mention if there will be early or late planting and the reason why, e.g. weather conditions (Agriculture.com, 2012).

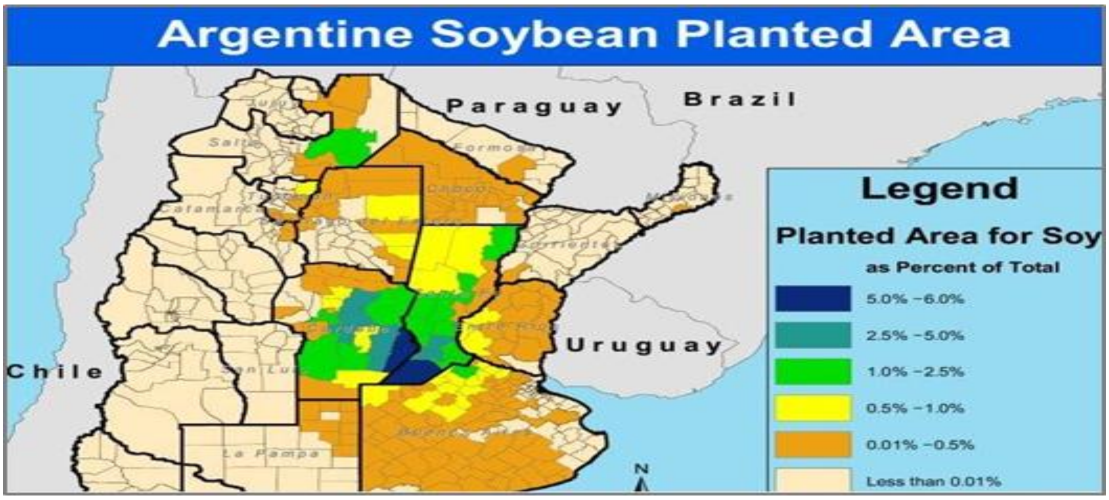

Figure 3.1: Coded map of Argentina planting progress
Source: *USDA*, 2013

These types of reports are released by organisations, such as the Buenos Aires Cereales Exchange, and corn, wheat and sunflower information is updated weekly and made available to stakeholders, as well as for public consumption online (Bolsa de Cereales, 2015). These reports give planting progress figures, compared with planting intentions, as well as the weather outlook for the week (Bolsa de Cereales, 2015).

The Buenos Aires Grain Exchange is the oldest commercial institution in Argentina. This grain exchange began trading in 1854, just a year after the Argentine constitution was adopted (Bolsa de Cereales, 2015), and the exchange is a non-profit civil association that serves as an intermediate service provider. The exchange is structured in a way that it can keep a balance between the representatives of supply and demand; governance is exercised by its board of directors (Bolsa de Cereales, 2015).

The board comprises members elected by the general assembly of associates, as well as by chairpersons of associated organisations; the activity of the exchange and its associated members is carried out in in the framework of free trade and association (Bolsa de Cereales, 2015). The members of the association are as follows: farmers, grain storage companies, cooperatives, brokers, and buyers (exporters, processing companies) that trade according to the established control and arbitrage mechanisms (Bolsa de Cereales, 2015). The mandate of the organisation is as follows:

- to foster the development of the Argentine economy.
- to offer a meeting place to its members.
- to encourage the creation of representative organisations for all the agribusiness sectors.

The main points to note about Argentina are that they transform data into understandable info graphics, as well as providing regular releases of information about planting progress online. The institution handling this information seems to be well organised, considering the many years of existence, and they remain independent. We also see that the organisation has a fair representation of role players from the grain and oilseed industry.

3.3 Australia

Australia, a major producer of wheat, has what they call Australian Crop forecasters. This organisation has been in existence for over 30 years (Crop forecasters, 2014). They are an independent leader in crop information services. Their client base includes; traders, end users, banks, insurance agencies, storage companies, logistics organisations and international buyers of Australian grain.

They have a wide range of reports that help users to formulate timely and accurate risk assessments. Their packages include crop reports and forecasts, which includes area, yield and production for both summer and winter crops in the major production regions (Crop forecasters, 2014). They have condition reports that keep users informed during the growing season as well as, weekly harvest reports, annual planting survey reports and much more (Crop forecasters, 2014). Their annual grower planting report provides an accurate indication of planting intentions and areas for the coming season (Crop forecasters, 2014).

They also have the Crop Forecasters Rainfall Monitor which picks up rainfall data from all relevant weather stations, compares current rainfall to the mean, any seasonal trends emerging and the impact on the coming season’s production (Crop forecasters, 2014). However these services are not free, hence a yearly or quarterly fee is paid by those who seek this information.

Although we do not have much on the scientific methodology used by the Australian crop forecasters, the main point to note is that this information is not free and in order for users to make informed decisions they need to pay a certain fee.

3.4 Brazil

In Brazil, they have what are called Crop Spotters, and this is basically where North and South American agriculture meets, says editor James Thomas (Cropspotters, 2015). The mission of this platform is to keep all interested parties in the loop about farming issues and production progress in South America on a weekly basis through individual Brazilian Crop Spotters (Cropspotters, 2015).This information gives insight from farmers and industry professionals (Cropspotters, 2015). Crop Spotters give reports and commentary on crop progress on their own farms and in their parts of the country. This report provides the reader with details of challenges faced on farms, issues overcome, and how profit is maximised

(Cropspotters, 2015). These reports are available every Tuesday throughout the Brazilian crop year, November to April (Cropspotters, 2015). There are 13 Crop Spotters and 10 of the reports produced are free to readers, while 3 Reports from prime Crop Spotters are only available through subscription (Cropspotters, 2015).

Although we do not have much on the scientific methodology used by the Brazil Crop Spotters, the main points to note is that participation is voluntary in supplying information to the organisation, and that the information is made available weekly, online, for public consumption.

3.5 USA

The USA has been the leading producer and exporter of grains and oilseeds since World War II. While some countries are catching up in terms of production numbers, when it comes to grain and oilseeds services, including the collection, processing and analysis of data and dissemination of information, the USA will probably remain the market leader for quite some time. The USDA compiles a number of reports of value throughout the season. Following on from their 'planting intentions' type of report, they publish a weekly planting progress report. South Africa has also been publishing a planting intentions report over the last few years. In the USA, data is available per state, as well as on a national basis. The information is often presented in two different ways, namely in comparison with the same week in previous years, and cumulatively, as depicted by Figure 3.2 and 3.3 below.

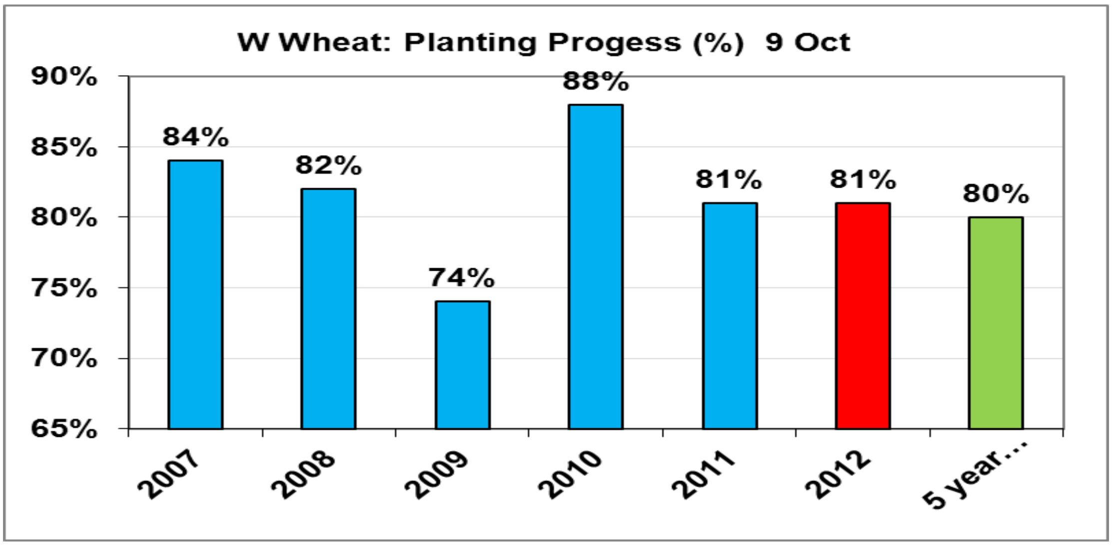

Figure 3.2: US winter wheat planting progress versus previous years, 2012

Source: Own D*ata*, 2012

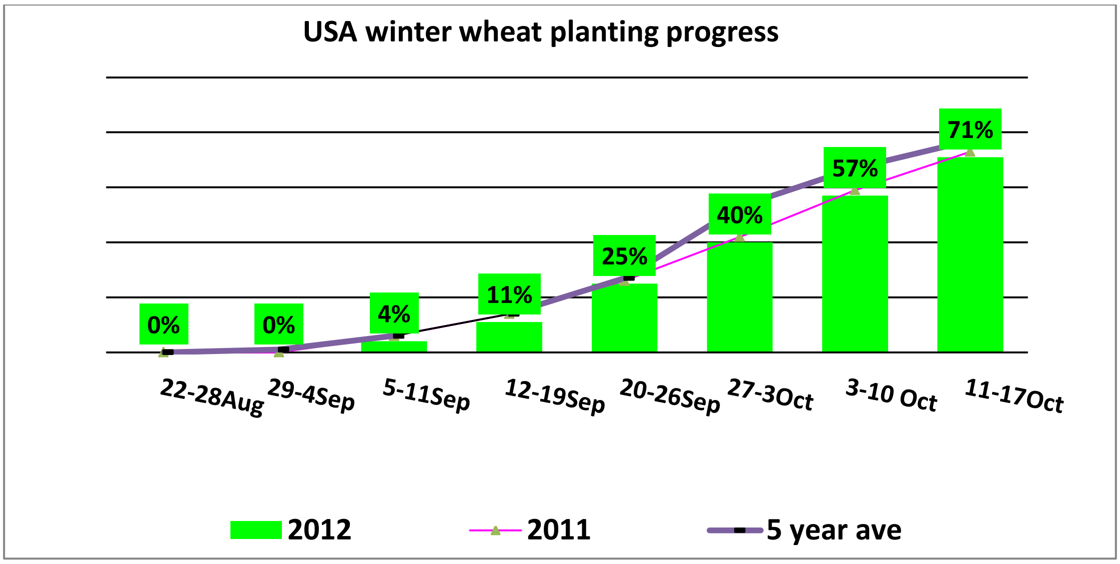

Figure 3.3: US cumulative planting progress of winter wheat, 2012.

Source: Own *Data obtained from USDA*, 2012.

As highlighted in our literature survey, the USA has clearly taken the lead in initiating and producing planting progress reports. In this section, we get to understand how CP reports are put together. Firstly, we look into the different selections of USDA reports throughout the production year. Secondly, we look at the survey and estimating procedures, and finally, the revision policy.

3.5.1 Selection of USDA reports

In a seasonal crop cycle, the USDA publishes the following reports**:**

- Crop production historical track record: January
- Winter wheat seedlings: January
- Crop value summaries: February
- Prospective planting: March
- Price reaction after USDA crop report: March
- Grain crops; January, March, June and September
- Crop progress: April-November
- Acreage: June
- Agricultural prices and Crop production: January-December.

Compared with the above, South Africa produces only three kinds of reports: planting intentions, crop estimates, and deliveries reports on a monthly basis. Looking at the number of reports in the USA, it is clear that South Africa has a gap to fill in terms of more frequent varietal information.

3.5.2 USDA survey procedure for CP Reports

Survey data is collected on a weekly basis from April through to end of November of each year, and crop progress and conditions estimates are based on this data. This is done through non-probability sampling of 4000 respondents, who are able to make visual observations and have regular contact with farmers. Most of these respondents are employees of the Extension Service or the USDA/Farm Service Agency. The goal is to have at least two respondents in every county across the country. Respondents come up with estimates based on standard definitions, throughout development of crops at various stages, as well as producer activities. A subjective analysis of the crop condition is also given by the respondents (USDA, 2014).

A questionnaire is completed by respondents on Fridays, and by Monday morning it is sent to NASS field offices in their states by email, mail, telephone, and fax, or through a secured internet website (USDA, 2014). A few reports are completed on Thursday, Saturday and Sunday, and respondents are also asked to report for the entire week ending Sunday; this is regardless of when questionnaires are completed. Reports that are submitted before the Sunday reference date usually introduce an element of uncertainty due to changes in progress or conditions that may occur during the weekend and are unaccounted for. Fortunately, there has been a recent change of events since the end of 2013 season, as over 30% of data received by NASS comes through the internet, and projection uncertainty is significantly reduced as a result of the majority of data being submitted on Monday morning (USDA, 2013).

At the beginning of the season, respondents are sent reporting instructions and contacted periodically to ensure proper reporting. Terms and definitions of crop stages are described in Table 3.1 below.

Table 3.1: Terms and conditions of crop stages

Emerged	As soon as the plants are visible.
Silking	The emergence of silk-like strands from the end of ears. Occurs approximately 10 days after the tassel first begins to emerge from the sheath, or 24 days after the tassel has emerged.
Dough	Normally half of the kernels are showing dents, with some thick or dough-like substance in all kernels.
Dent	Occurs when all kernels are fully dented and the ear is firm and solid. There is no milk present in most kernels.
Mature	Plant is considered safe from frost. Corn is about ready to harvest, with shucks opening, and there is no green foliage present.
Corn Phenological Stages	
Emerged	As soon as the plants are visible.
Blooming	A plant should be considered as blooming as soon as one bloom appears.
Soybean Phenological Stages	
Setting Pods	Pods are developing on the lower nodes, with some blooming still occurring on the upper nodes.
Dropping Leaves	Leaves near the bottom of the plant are yellow and dropping, while leaves at the very top may still be green. Leaves are 30/50 % yellow
Wheat Phenological Stages	
Emerged	As soon as the plants are visible.
Headed	The head is present, visible, and fully emerged.

Source: *NASS*, 2014

3.5.3 USDA Estimating procedure for CP Reports

The procedure for estimating USDA CP Reports is that reported data is compared with the previous week's data, as well as those of surrounding counties, in order to check for reasonableness and consistency. NASS county-acreage estimates are used to summarise reported data at district and state level, and this is done at state field offices (USDA, 2014). Summarised indications are compared with those of the week before, and progress items compared with earlier stages of development and historical averages to ensure consistency, while comments from respondents and weather events are also taken into consideration (USDA, 2014). All state estimates are submitted to the Agricultural Statistical Board (ASB), together with supporting comments; they are then compared with surrounding states and compiled into a national-level summary by weighing each state by its acreage estimates (USDA, 2014).

3.5.4 USDA Revision policy and non-response adjustment for CP Reports

The CP Report for progress and conditions is released after 4:00 pm Eastern Time on the first business day of the week, and these estimates are subject to revision in the following week (USDA, 2014).Their goal is to achieve an 80 % response rate for each of their weekly surveys. For all surveys for which they do not receive a response during a given week, they impute a gain in progress for each individual commodity stage, based upon the average gain of completed surveys in that non-respondent's district. The imputation values are reviewed by a statistician in each state before the imputation is completed.

3.5.5 Data analysis and quality control in general

All incoming data is reviewed by statisticians in each state, as it is received. All data is subject to automatic checks to verify that progress items are greater or equal to the previous week, greater than the previous progress stage, and that condition categories add up to 100 %. Statisticians also analyse data for reasonableness for their state and the time of year. These statisticians then set estimates for each crop progress and condition item, and send them to their headquarters. The headquarters' statistician then conducts an additional level of analysis, comparing estimates with surrounding states and checking for reasonableness.

3.5.6 USDA CP Report analysis

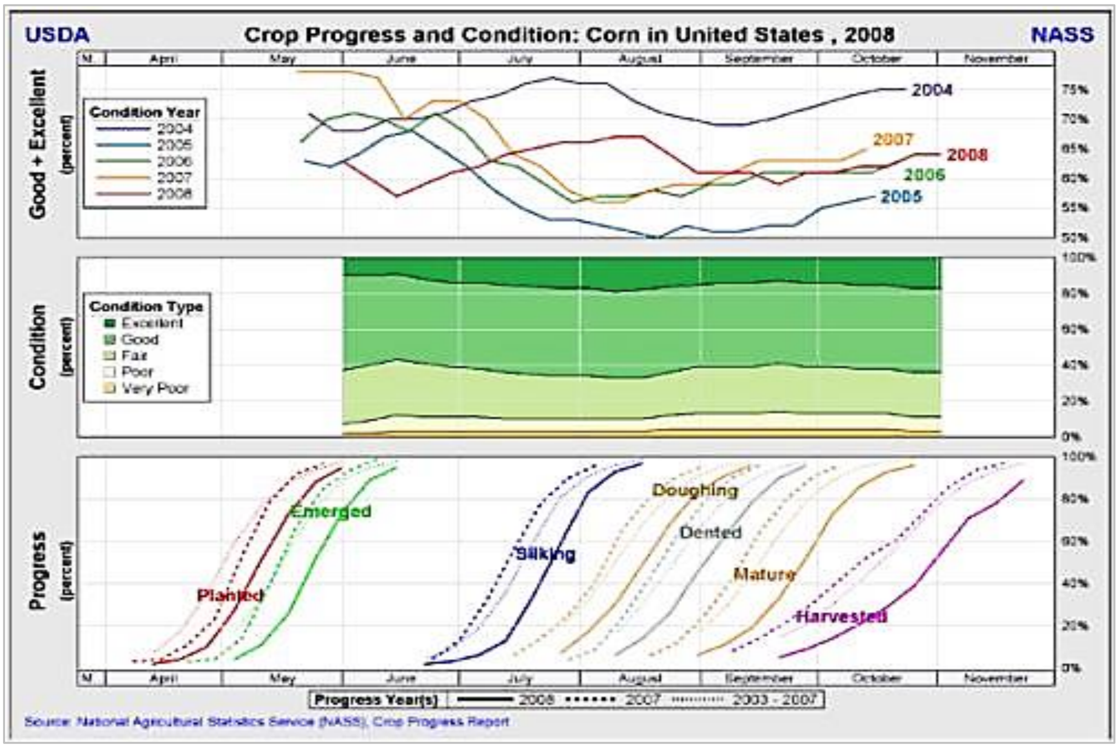

Figure 3.4: Crop progress and conditions

Source: *USDA*, 2014

Figure 3.5 above shows a graphical representation of how planting progress information can be used to produce online products. This, for example, is a depiction of the 2008 USA crop throughout the key stages of its phenological cycle. The first part of the graph shows percentage values of cumulative progress for each crop at key stages and which are identical to published values. The second portion of the graph contains conditions ratings which are stacked and always sum up to 100. The last portion of the graph contains progress for the current year that is identified by bold lines in comparison with the previous year, which is depicted by dashed lines and the past four years depicted by dotted lines. Such charts are compiled using the same data range in order to make accurate comparison.

3.5.7 Planting date

Over the years, it can be observed that planting dates have shifted considerably, either to an earlier date or a later one. Planting date is of utmost importance, as it determines the fate of the crop (De Bruin, 2008). The planting dates for all grain and oilseed crops need to be evaluated as a factor to help increase potential yield and profitability (Gothenburg Learning Center, 2011). For instance, corn that is planted 10 days or two weeks early may not yield as much as when corn that is planted on or near the optimum date, but corn will definitely yield better than that which is planted two weeks after or more (Nafziger, 2008). Considering agronomic aspects, according to Nafziger (2008), it is better to plant early as it allows for better control of planting, and should anything go wrong then there can be replanting, and it allows for extra choice maturity in hybrids. Although there are disadvantages, like cold and wet soil when planting early, these are outweighed by the advantages. Figure 3.6 below shows the effects of planting dates on the yield of 2.4 and 3.1 relative maturity (RM) Genuity Roundup Ready for two soybean varieties-2011.

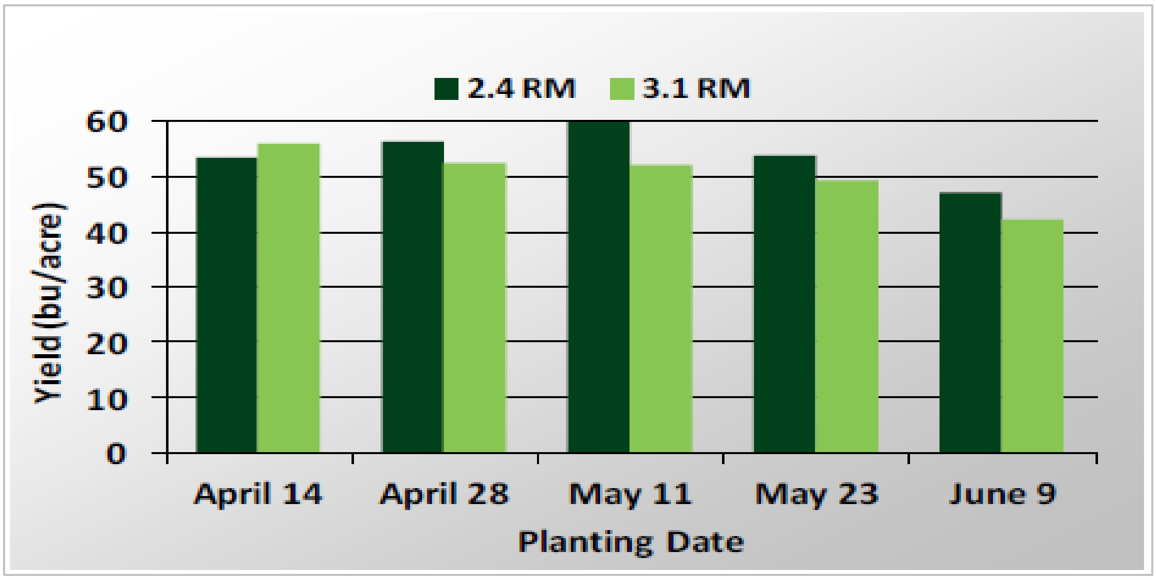

Figure 3.5: Effects of planting date on yield for two soybean varieties

Source: Gothenburg Learning Center, 2011

In the USA, the delays seen in the May 2013 maize and soybean planting season could have had devastating consequences for world supplies. One study, for example, released by the University of Illinois calculated yields to drop dramatically with planting dates from the 3rd week in May. Figure 3.8 below shows how average planting dates correlate with yields.

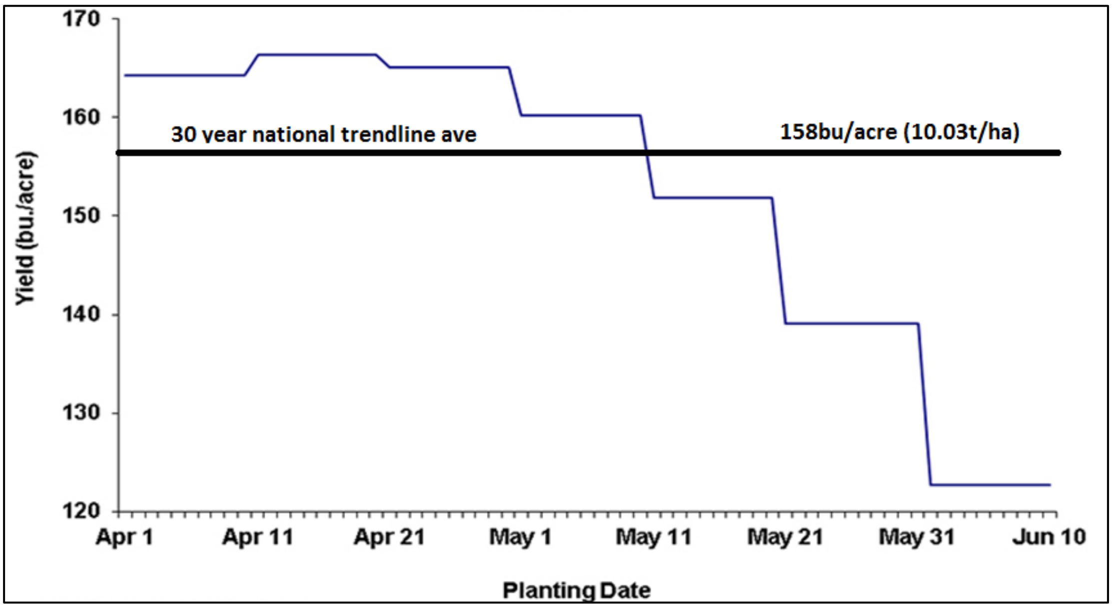

Figure 3.6: Response of corn yield in central Illinois to planting date

Source: *Nafziger et el* ,2007 – adjusted.

A planting progress report would be of great value to the South African grain and oilseed industry, considering that in overseas countries, especially where a database has been established, planting dates contribute to the scientific prediction of expected average yield outcomes. A single year could deviate from the average, as could a single farm or district. However, on a provincial or national basis, for the majority of years, the outcome of the crop could be predicted with a fair degree of accuracy based on planting dates. For example, the crop was planted very late in the 2012/13 planting season in the North West Province, already indicating a warning to the industry of potential problems to come. If planting date records linked to yields, say for the last 20 years, were available, we could have predicted the potential impact of the late planting season in North West with a much higher degree of certainty.

3.6 The rest of the world

Although other major grain and oilseed producing countries do not have a particular CP, they rely on the USDA for updated information. The Foreign Agricultural Service (FAS) connects US agriculture to the rest of the world to enhance trade and global food security (NASS, 2015). The NASS staff is based in Washington and there is in addition a global network of 96 offices, covering 167 countries (NASS, 2015). Staff members consist of agricultural attachés and locally hired agricultural experts, constantly keeping US agriculture informed about the world. They identify problems, practical solutions and give advice to the USDA, and also help in developing and supporting foreign policies around the world (NASS, 2015). FAS has a unique market intelligence capacity attributable to a network of global contacts and enduring relationships with international groups, and furthermore has analysts that provide objective intelligence on foreign agricultural market opportunities. They prepare production forecasts, access export markets, and track policies that affect US agriculture (NASS, 2015).

Informa Economics, formerly known as Sparks Companies, Inc., is known around the world for its leadership in broad-based domestic and international agricultural research, and commodity and market research, as well as analysis, evaluation and consultation (Informa Economics, 2015). The company was founded in 1977 and acquired Informa plc in 2003; they a have headquarters in Memphis, Tennessee and they serve hundreds of firms and institutions across the globe. Part of this group is made up of FNP Brazil in Sao Paulo, CEAS in London and Brussels, and WPA in Washington, DC (Informa, Economics, 2015). This company uses data from the USDA and other associated institutions to analyse data and make it readily available for decision making by the companies it serves throughout the world. Reports are usually written about major grain producing countries, such as Australia, Argentina, Canada, China, India, Brazil, Russia, Ukraine and the USA. From the above, it is clear that every country's grain and oilseed industry requires timely and regular information to serve the market.

3.7 Summary

Chapter 3 underwrites the study's first hypothesis, namely "leading grain and oilseed producing countries benefit from the publication of a planting progress report". We focused on the different methodologies used by some of the major grain oilseed producing countries. All of the countries mentioned in this chapter have been doing this for years, and that on its own is a sign that resources are not being wasted, indicating that there is actually a benefit for them to keep producing these progress reports. Argentina uses info graphics and information from stakeholders to put together their weekly progress reports, while Brazil and the USA rely on farmers and other key stakeholders on the field. The rest of the world relies on inputs from the USDA, as well as private organisations like Informa Economics and Australian crop forcasters.

During a production season, USDA produces about 9 reports throughout, whereas South Africa only has three reports. A non-probability sample of 4000 respondents is used acquire information for CP: questionnaires are sent back, using all kinds of communication technology, which makes it very convenient for all involved. Reported data is then compared with the previous week's data, as well as the previous year's data, at the same time. Data is analysed, adjusted for non-responses, and checked for quality purposes by NASS.

Planting progress reports are also beneficial in terms of getting the right planting date, as it determines the fate of the crop. This helps potential yield and profitability for the producer. Producers are able to compare their current crop with previous years, as well as with progress from other parts of the country.

South Africa could benefit from the practices of the major crop producers in the world. Although they all have varying methodologies, it all comes down to the same point, which is to provide timely and frequent information on crop progress for stakeholders to make decisions. Chapter 4 will analyse a specific case study in support of the benefits. We also see that the use of ICT is vital for the timely transmission of planting progress information.

CHAPTER 4

INFORMATION SOURCES IN THE SOUTH AFRICAN GRAIN AND OILSEED INDUSTRY

4.1 Introduction

This section focuses on sources of information for the grain and oil seed industry in South Africa, which are the South African Grain Information Services (SAGIS) and National Crop Estimates committee (CEC). In this section, we look at the type of information furnished by these sources and the methodology used to access the information. We then look at the shortcomings thereof, as well as the potential solutions that a crop report would bring to fill the current gap.

4.2 An overview of current reports published

South Africa predominantly has two official sources of market information for the grain and oilseed industry, namely the CEC and SAGIS.

4.2.1 CEC

The National Department of Agriculture (NDA), now called the Department of Agriculture Forestry and Fisheries (DAFF), is the custodian of the National Crop Estimates Committee (CEC) that is responsible for the summer and winter grain crop production estimates, which are published monthly (Ferreira *et al*, 2006). This committee was established from a previously existing committee in the year 2000, after the liberalisation of agricultural markets in South Africa. The CEC comprises people from various institutions of government, who do not have vested interests. The structure is depicted in Figure 4.1 below.

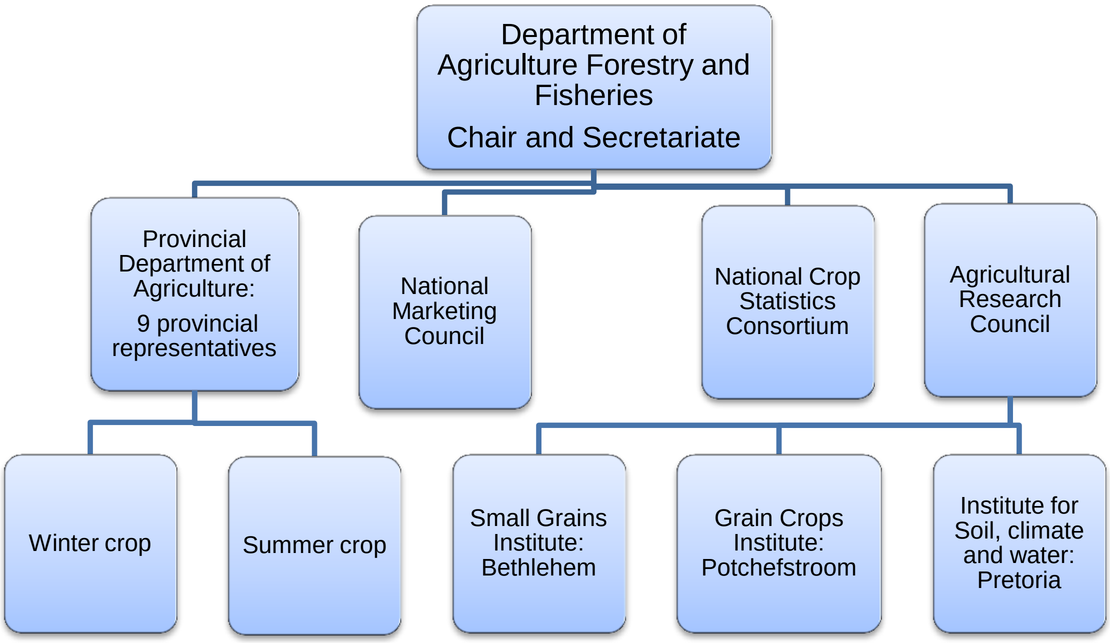

Figure 4.1: Composition of CEC

Source: Data from DAFF, 2014

Figure 4.1 above shows the composition of the National Crop Estimates Committee. The Department of Agriculture Forestry and Fisheries is the custodian and acts as the chairperson/director of the committee, as well as providing the secretariat. The 18 provincial representatives from the Department of Agriculture have a supervisor who consolidates both winter and grain estimates and presents these at the meetings. There are also representatives from the National Marketing Council (NAMC) and the National Crop Statistics Consortium, as well as the three subsidiaries of the Agricultural Research Council; Grain Crops Institute, Small Grains Institute, Institute for Soil, Climate & Water.

4.2.2 CEC meetings

4.2.2.1 Commercial crops

The following procedure reflects how meetings are conducted by the CEC. During the season, commercial crops are estimated on a provincial basis by the committee, and the following is included (DAFF, 2014);

The crop, produced in tons per ha, comprises the following: firstly, crops that will be delivered for storage, secondly crops that will be sold to cooperatives and millers etc., and lastly, crops that will be retained on the farm for own consumption.

4.2.2.2 Non-commercial crop

Subsistence agriculture is also estimated at the beginning of the season, which includes the former homeland areas, as well as that which is personally consumed and not delivered to the market (DAFF, 2014).

4.2.2.3 Meeting protocol

Different data suppliers provide information and this is summarised on Excel sheets and shared with the committee members during meetings. Only 10–15 minutes are allowed for committee members to look at the figures. Furthermore, weather conditions are also presented (DAFF, 2014).

Area planted for a particular province is the first thing evaluated for the estimation process, and after setting the area, there are estimations made for the yield of a particular crop in the specific province. Production is then derived from multiplying area planted by yield (DAFF, 2014). Input data received from different sources is discussed by committee members for specific crops and provinces, and then a forecast/estimate is set (DAFF, 2014).

The provincial official for a particular province is given the opportunity to present prevailing conditions in that area for a particular crop, and also gets to present his or her forecast/estimate, thereafter DAFF takes the platform to present their own results from their survey about a particular crop for a specific province. Other committee members also get the opportunity to present their views during this process (DAFF, 2014). The chairperson then verifies and agrees upon the yield and area planted for specific crops and provinces, and then the national area planted is obtained.

The area planted to the crop in each province is multiplied by the yield of that crop for each province to get the production of the crop for that province. Province totals are then added up for that specific crop to come up with a national production forecast for the crop. Procedures are repeated for each province. Each member hands over an Excel spread sheet to the secretariat at the end of the meeting (DAFF, 2014).

The CEC provides pre-harvest information on a monthly basis. It is, therefore, proposed that the South African grain and oilseed industry acquire more frequent information to fill the gap between the current pre- and post-harvest reports.

4.2.3 Crop Estimates users

Crop estimates are used by various stakeholders in the grain and oil seed industry. These are most likely to be the same users for the proposed crop progress report. They are as follows (DAFF, 2014): grain and oil seed traders, farm input suppliers, financial institutions that provide role players with funding, farmers and producer organisations, insurance brokers, local and international agricultural government organisations, trade and industry departments, educational institutions, research institutions, statistics agencies, etc.

4.2.4 The need for a planting progress report in South Africa

It can be argued that South Africa already has crop estimates for grains and that might seem enough. However, a planting progress report will not compete with the crop estimates report. The crop progress report would fill a specific gap in the production seasonal calendar. The crop progress report will also not stand on its own in isolation, but will support the outcome of the other estimates and will therefore help in making the current national crop estimates more accurate.

The crop progress report is meant to aid producers in knowing when to plant, how much to plant, and how to spread their plantings. Grain users need to have this information in order to know how to align their strategies according to the availability of grain on the market, and policy makers need this information in order to implement such reports and make sure they are sustained.

Table 4.1 below shows the different calendar months and the types of estimate reports for any particular month. These estimates are made from just after planting until the final crop has been harvested.

Table 4.1: CEC summer grain monthly reports

Month	Report
October	Summer crops: intentions to plant for the following year.
January	Preliminary area planted: estimate for summer crops for the new year.
February	Summer crops: revised area and 1st production forecast.
March	Summer crops: revised area and 2nd production forecast.
April	Summer crops: area planted and third production forecast.
May	Summer crops: area planted and fourth production forecast; current year with revised maize production for previous year.
June	Summer crops: area planted and fifth production forecast.
July	Summer crops: area planted and sixth production forecast.
August	Seventh production forecast for summer crops.
September	Summer crops: final production estimate.

Source: *DAFF*, 2015

4.3 Methodologies used by the main input suppliers to the CEC

This section elaborates on the methodology used by the CEC, illustrating the structures and resources already available, which could be beneficial in putting together a planting progress report, as the same resources and input suppliers can be used. This would mean that a planting progress report could borrow from CEC resources, meaning it would incur lower costs.

4.3.1 Grain Silo Owners (GSO)

Grain silo owners supply the CEC with input per province for most crop estimates on a monthly basis. However, they are only able to account for grains that have been submitted, and not those still under the care of the producers (DAFF, 2015).

4.3.2 Agricultural Research Council

4.3.2.1 Grain Crops Institute (GCI)

The ARC-GCI supplies inputs for yield forecast for summer grain crops for different summer rainfall provinces, using the CERES maize model. The CERES Maize Model is a sophisticated tool, which is sensitive to the interactions of major plant growth processes to the environment, with little input data (Hodges *et al*, 1987). The model is a growth simulation model, which simulates yields on approximately 8650 soil and 695 weather points over the summer rainfall area. Climate data, together with soil data, and the management are used to simulate for the specific points. The points are then used to attain yields for the different provinces across the country (DAFF, 2015).

4.3.2.2 ***Small Grains Institute (SGI)***

The Small Grains Institute has over 40 years of experience, which is used for the compilation of estimates according to prevalent conditions. They are able to compile information due to the constant liaison with major winter grain producing areas (DAFF, 2015).

4.3.2.3 ***Institute for Soil, Climate & Water (ISCW)***

The ISCW relies on its multidisciplinary approach, scientific excellence and technological skills (ARC, 2015). They use a holistic approach and innovatively provide solutions to their clients with regard to sustainable land use, natural resource conservation, and environmental quality (ARC, 2015). The ISCW is responsible for the development of new crop forecasting systems. Moreover, they present on a monthly basis the weather conditions outlook and satellite image, derived Normalised Difference Vegetation Index (NDVI) information, to the National Crop Statistics Consortium (NCSC).

4.3.3 Provincial Departments of Agriculture (PDAs)

There are PDAs members representing the nine provinces of South Africa and they use different methods to determine production in their provinces. Local conditions are assessed and direct consultations done with farmers and farmer study groups by the provincial extension officers. They also make their own observations on weather conditions, crop pests and diseases, as well as crop conditions. PDA representatives have created a network of informants for area and plant yield; these include co-operatives, seed companies, producer organisations and commercial farmers. The information gathered on area planted and yield is used to make forecasts. However, the contribution by PDAs in the estimation process depends on the networking skills and experience, as well as the capacity of the province with regard to finances. We can therefore conclude that PDAs base their estimates subjectively, rather than scientifically.

4.3.4 Department of Agriculture Forestry and Fisheries (DAFF)

4.3.4.1 Methodology used for the commercial sector

For the estimation of summer and winter crop production, DAFF makes use of sample survey (DAFF, 2008). An estimation of the area planted is made at the beginning of the season and thereafter a monthly forecast is produced throughout the growing season. A survey questionnaire for 300 summer and 2400 winter respondents is sent by DAFF to a non-probable sample of participants (DAFF, 2008).

Area for the season is estimated by comparing current area planted by respondents with area planted in previous seasons, per province. The calculated increase or decrease is then added to the total area per district for the previous season and then the estimation is made, thereafter the current estimation is used to calculate average yield for all provinces (DAFF, 2008).

Because SAGIS' deliveries are only available about 6 months after the marketing year has started, it is difficult to benchmark CEC data immediately (DAFF, 2008). This creates a situation where estimated errors from the previous year are carried over to the following year (DAFF, 2008). A second problem is that the mail survey response has not always been adequate, although other methods have been used in recent years, like phones and email (DAFF, 2008).

Considering the importance of the proposed planting progress report, it could certainly fill the gap, because it would be released on a weekly basis and this would help complement the current estimates, as there would already be data available to benchmark against .This would help create better statistical data and reduce carrying over errors from the previous year.

In order to determine retention levels at the end of the season, a maize and wheat usage mail survey is sent out by DAFF, and this information is gathered to note the quantity of maize and wheat retained on farms for own consumption.

4.3.4.2 Methodology used for the subsistence[2] agricultural sector

According to DAFF, for CEC purposes, PDAs provide data regarding subsistence farming in the beginning of the production season, which data is provided by extension officers in different regions of the province.

4.3.4.3 National Crop Statistics Consortium (NCSC)

The NCSC, formed in 2001, consists of the following bodies: ARC, GeoterraImage (Pty) Ltd, and SiQ (Pty) Ltd. Two systems were developed and used for crop forecasting; the first system is the Subjective Area Frame and Objective Yield System, and the second one is the Producer Independent Crop Estimated System (PICES).

4.3.4.4 Subjective Area Frame System

For the subjective area frame, it was decided for reasons of feasibility to survey only the major producing provinces in South Africa which account for 85 % of production, namely Free State, Mpumalanga, North West and Gauteng, for summer crops. This brought about the development of a general area frame that can be used for other agricultural surveys. Different strata were established according to different land uses and cultivation densities. Every season, the area is surveyed with a point sample frame. There are two kinds of surveys completed and a farmer-expected (subjective) yield survey and objective yield are assessed.

The subjective survey is done using a selection of a random number of points over relevant provinces. For summer crops, data is collected for white and yellow maize, sunflower seeds, sorghum, soy beans, ground nuts and dry beans (DAFF, 2004). For the points where maize is located, they are used to select a sub-sample for objective yield surveys. For the winter survey, data is collected for wheat, malting barley, canola and sweet lupines. The points with wheat are then used for the objective yield survey sub-sample.

4.3.4.5 Design of the system

4.3.4.5.1 Stratification

Stratification is done using satellite imagery. The stratification process has two stages; firstly, there is an update of the existing land cover in order to point out which areas are not

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2 "Defined as farming operations where output is produced primarily for own consumption of the farmer and his/her family and not for cash sale (2008, p 5)."

cultivated, and secondly, the cultivated area that remains is classified into 3 density strata, with both processes being done using new land-sat imagery (DAFF, 2008). The two components are then merged to create a single national coverage, which then becomes the basic sampling framework used to guide the distribution and location of field sampling points (DAFF, 2008).

4.3.4.6 Sample frame

A regular point grid of 225 m by 225 m is used to set up a point sample frame, which is overlaid over the stratified map of South Africa (DAFF, 2008). Using GIS technologies, numbers needed per strata and per province are calculated, and then randomly selected points are used for field or telephonic surveys (DAFF, 2008).

4.3.4.7 Subjective area and yield survey

4.3.4.7.1 Data collection process

Field data can be collected either by visiting the location or by means of telephonic interviews, depending on the type of survey. Enumerators undergo extensive training and also sign non-disclosure agreements (DAFF, 2008).

Interviewers use hand-held GPS devices and standard map sheets to find the designated areas. They then request permission to access premises and conduct the interview using questionnaires (DAFF, 2008).

4.3.4.7.2 Data capturing process and quality control

The data capturing process is computer based and there are quality checks to ensure minimal data entry faults, which allows for quick data analysis at all times (DAFF, 2008).

For quality control purposes, ARC personnel survey about 5 % of the surveyed points. With a digital data base, field questionnaires are checked for quality. Progress of field surveys is monitored on a daily basis and support is accessible from NCSC staff members, wherever necessary (DAFF, 2008).

4.3.4.7.3 Data analysis and expansion

If a farm that produces crops of interest is found in a particular stratum, it then represents a typical farm within the province, and typical farms of that nature within the stratum (DAFF, 2008). Calculating what each point represents, the stratum area is divided by the number of points in the stratum (which provides the expansion factor), and multiplied by factor of the crop divided by area, thus providing the ratio of crops to total farm size (DAFF, 2008).

There are three estimates that are derived: point-based estimates, and field-based and farm-operation-based estimates (DAFF, 2008). These estimates are generated for provincial and national crop area production, with the farm-based estimates being the most reliable, and finally these results are presented to the CEC meeting on a provincial basis (DAFF, 2008).

4.3.4.8 Objective yields survey

This survey is meant to derive a yield from measurements that are taken of a crop; it depends on subjective survey points with a methodology called probability proportional to size being used to select a sub-sample of points, after which the points are used to do an objective yield survey (DAFF, 2008). The sub-sample fields are visited and two plots are chosen at random, and measurements are then taken on the plots, counting the number of plants on the selected plot, as well as the ears, seeds and mass calculated (DAFF, 2008). From the measurements made, yield is calculated and this is done during April and March for relevant provinces, with results being presented to CEC on a provincial basis (DAFF, 2008).

4.3.4.8.1 Producer Independent Crop Estimates System (PICES)

Starting in 2002, statistical analysis had been based on information from producers. However, this was problematic because producers did not provide accurate information, or sometimes even refused to provide information. Due to the need for accurate statistical information, an alternative process was found. The Producer Independent Crop Estimate System (PICES) was developed in 2005. This system uses crop field boundaries, digitalised from satellite imaging, with a point sampling system to objectively estimate the area planted with grain crops (Fourie, 2009). The system has the following process: i) obtain satellite imagery, ii) Digitise crop field boundaries from satellite imagery, iii) design the point frame and select random sample points, iv) use aerial survey sample points to capture crop data, and v) perform statistical analysis (Fourie, 2009). The newest satellite and graphic information systems available in South Africa are used in the PICES and the start-up costs of the project has been jointly funded by the DAFF and the Maize Trust. The maintenance of the system will be funded by the DAFF (DAFF, 2014).

4.3.4.8.2 Obtaining Satellite Imagery

Satellite imagery for the project is made available by the South African Government through the Department of Agriculture. SPOT Image Spot 5 satellite imagery, with a 2.5-meter resolution, is obtained from the department and is used as the base layer for digitising through ArcMap at a scale of 1:10 000, with comprehensive quality control being done. Data elements for provinces are constantly updated (Fourie, 2009.)

4.3.4.8.2.1 Aerial Surveying of Sample Points to Capture Crop Data

This process determines which crop is planted in the field, on each sample point. Surveys are conducted by field observation teams that consist of an observer and a pilot, using a light aircraft (Fourie, 2009).

A Tablet PC connected to a GPS and running ArcPad[3], is used to capture this data. ArcPad is customised with a user-friendly interface. The field observer notes which crop is planted at the sample point and whether it is dry land or irrigated cultivation. Each photo taken is automatically linked to a shapefile[4] that indicates where it was taken (Fourie, 2009).

4.3.4.8.3 Performing Statistical Analysis

The field data is captured and stored in shapefile format. This data is uploaded to a central server on a daily basis and imported into a SQL Server database. Expansion statistics are used to calculate estimates of the area planted in each grain crop on a provincial basis.

4.3.4.9 ***Design of the system***

4.3.4.9.1 Stratification

The stratification for PICES is done by mapping (digitising) from satellite imagery, showing the field crop boundaries of all the fields that could possibly be planted to crops in South Africa. For Free State, North West, Mpumalanga and Gauteng provinces, the mapping was done using Land-Sat imagery. For Eastern Cape, Northern Cape, Limpopo and Western Cape, mapping was done using Spot-5 imagery (DAFF, 2008). The same classification used

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[3] ArcPad is mobile field mapping and data collection software designed for GIS professionals. It includes advanced GIS and GPS capabilities for capturing, editing, and displaying geographic information quickly and efficiently. (Esri, 2016).

[4] A shapefile is an Esri vector data storage format for storing the location, shape, and attributes of geographic features. It is stored as a set of related files and contains one feature class (Esri,2016).

in the Subjective Area Frame System is then used to classify the digitised fields into the different strata.

4.3.4.9.2 Sample frame

In the same way as with the Subjective Area Frame System, a grid of points is then used and overlaid over the stratified map of South Africa in order to set up the point sample frame. The only difference is that the grid size used for the PICES point sample is 22,5 m x 22,5 m, where with the Subjective Area Frame System, a 225 m x 225 m grid was used (DAFF, 2008). The sample points to be surveyed are then also selected in the same way as in the Subjective Area Frame System, using stratified random sampling (DAFF, 2008).

4.3.4.10 Aerial survey

4.3.4.10.1 Data collection process

An aircraft is used to survey the selected points. The aircraft is equipped with a sophisticated Global Positioning System (GPS) that allows for the easy capturing of field crop-type data. Quality control is done by revisiting some of the points using a motor vehicle (DAFF, 2008).

4.3.4.10.2 Data analysis and expansion

In much the same way as with the Subjective Area Frame System, the data is expanded, using expansion statistics, to all the fields in the strata in order to obtain an estimate of the area planted for each crop per province. The results are then presented to the CEC meeting (DAFF, 2008).

4.3.4.11 *Gauteng census*

The SIQ (Pty) Ltd conducted a census in 2007 of all fields within Gauteng, with the aim of the project being (1) to provide an ultimate benchmark for the area planted under maize, (2) to compare all possible information providers with that of the census with regard to maize area planted, and (3) to enable CEC to use the results as a possible weighting tool for information providers of area estimates (DAFF, 2008).

They concluded that the census was a true reflection of the reality on the ground and the results should therefore be considered accurate, and that other methods like PICES should therefore be evaluated against the benchmark (DAFF, 2008). Role players considered the results and suggested that the census results of area planted in the Gauteng Province should be used as benchmark for all other inputs to the CEC. It was also decided that the PICES methodology of determining crop area can be seen as accurate and reliable (DAFF, 2008).

Considering the general area frame which has been established by CEC, it would make more sense to use the same area for a planting progress report, considering that it accounts for about 85 % of production in South Africa. However, a crop progress report would require a more objective approach, considering the proposed frequency of the report.

4.3.5 SAGIS

Grain industry players have established a Section 21 Company called SAGIS, which operates on a well-developed and coordinated market information system on all markets (NDA, 2008). SAGIS was established on 11 November 1997, after the deregulation of marketing and control boards of South Africa (SAGIS, 2015). SAGIS provides post-harvest information on deliveries at silos, export and import parity prices, and tariffs and so forth, which is provided through the SAGIS website and through regular market bulletins (see Figure 4.2 below). The four industries serviced by SAGIS are maize (white and yellow), oilseeds (sunflower, soybean, canola and groundnuts), winter grains (wheat, barley and oats) and sorghum (SAGIS, 2015). The main goal of SAGIS is to gather, process and analyse timeous information, making sure it is reliable, and distribute it to role players (SAGIS, 2015). Furthermore, SAGIS is entrusted with other functions like monitoring import tariffs and audit certificates for minimum market access (SAGIS, 2015). The mission of SAGIS is the collection and publication of post-harvest information. Although post-harvest information is necessary, the market needs to be informed about planting progress, as well. This is crucial for the effective functioning of the market, because this kind of information can help prevent opportunistic behaviour on the commodity markets and would allow better decision making.

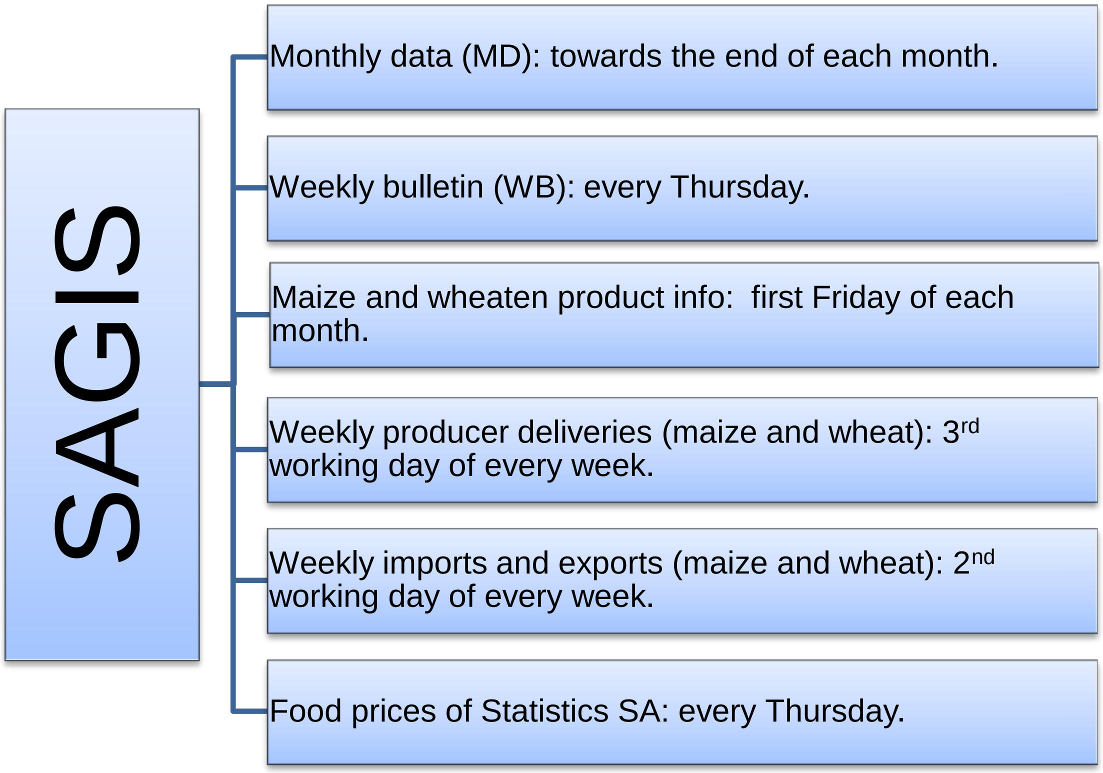

Table 4.2: SAGIS Activities

Source: Data from *SAGIS*, 2015

4.4 Benefits of planting progress reports: the USA as a case study

4.4.1 Introduction

This section will highlight the importance of a planting progress report. Although the USA is a leader in CP Reports, not much research has been produced on the benefits thereof. However, compared with other countries, the benefits are evident, although it appears that only one person has been published in peer-reviewed journals. The USA will, then, serve as a case study for this section. A study by Lehecka (2013) will be used in support of the objective that the leading grain and oilseed producing countries benefit from the publication of a planting progress reports. Her objective was "To investigate the reaction of corn and soybean futures markets to crop progress and condition information of USDA's CP reports in an event study methodology over the period 1986-2012."

An event methodology was used: if prices react to information ("the event"), then the information is considered valuable. Any new information regarding crop progress is expected to change perceptions of participants and that change in perception is reflected in change in prices. USDA reports are therefore seen as valuable if the variability in price returns is greater on the days when reports are released, than on those days when they are not released.

Data used for analysis was arranged accordingly. As mentioned in the crop progress surveying procedure, CP reports contain weekly progress over the duration of the growing season. The following are listed: cumulative planting, harvesting progress, and crop condition for major producing states. Futures price data was used and new crop contracts where used, since CP information is considered as new information. The analysis was grouped into two – announcement and market impact analysis. For announcement effect, if CP contains valuable information, then price movement must be larger on days following the report. For market impact analysis, prices are expected to react quickly to the new information in an unbiased way.

In conclusion of the study, it was found that CP reports provide valuable information to corn and soybean futures markets. Secondly, crop reports with conditions had more of an impact in the variance, implying that the combined effect of crop progress and conditions has more of an impact on the market. Finally, there was a strong suggestion by the market impact analysis that prices react quickly and move in the expected direction.

This study illustrates the impact that CP reports have on the grain and oilseed markets, especially when there is an emergence of new information that was not expected. This is just an indication of the importance of market information in the grain and oilseed market.

Figure 4.2: Futures Return Volatility Test Results for Crop Progress Reports for Corn and Soybeans, Non-Weekend Close-to-Open returns, April to November, 1986–2012

	Corn						Soybeans					
Reports	*N*	Report Day Variance	Pre-/ Postreport Day Variance	Diff. in Report and Pre-/ Postreport Variance	*F*-Stat.	Kruskal-Wallis χ^2-Stat.	*N*	Report Day Variance	Pre-/ Postreport Day Variance	Diff. in Report and Pre-/ Postreport Variance	*F*-Stat.	Kruskal-Wallis χ^2-Stat.
All	940	0.51	0.34	0.17	1.49**	22.96**	890	0.36	0.26	0.10	1.37**	16.60**
Condition & Progress	554	0.67	0.40	0.26	1.66**	22.32**	486	0.53	0.33	0.19	1.58**	32.66**
Progress	386	0.27	0.25	0.03	1.12	3.13	404	0.16	0.17	-0.01	0.95	0.10
April	114	0.22	0.18	0.04	1.23	7.19*	114	0.07	0.05	0.02	1.35*	0.68
May	116	0.49	0.30	0.19	1.64**	13.78**	116	0.25	0.18	0.07	1.40*	0.37
June	120	0.63	0.52	0.10	1.20	3.08	120	0.28	0.47	-0.20	0.58**	0.80
July	119	1.35	0.67	0.68	2.02**	15.68**	119	1.16	0.57	0.58	2.02**	14.06**
August	120	0.81	0.33	0.48	2.47**	10.67**	120	0.61	0.26	0.35	2.36**	21.45**
September	115	0.18	0.20	-0.03	0.87	0.88	115	0.16	0.12	0.03	1.27	8.16**
October	120	0.20	0.22	-0.03	0.89	2.55	120	0.10	0.13	-0.04	0.72*	1.38
November	116	0.09	0.29	-0.20	0.32**	1.28	66	0.12	0.33	-0.21	0.37**	0.02

Note: Returns are computed as the difference in the natural logarithm of price multiplied by 100. *N* denotes the number of reports included in the sample. New-crop futures contracts (December corn and November soybeans) are used. Single (*) and double (**) asterisks denote significance at the 5% and 1% levels, respectively.

Source: *Lehecka* (2013).

Table 4.2 above shows statistical test results on variability of report days and pre/post report days for the period 1986-2012. For corn, the variance on return for CP report release days is 1.49 times greater than pre-/post report days, and for soybean it is 1.37 times greater (Lehecka,2013). From both parametric and non-parametric statistics, it is revealed that an increase in return variability on report days is consistently significant for both corn and soybeans, at a 1 % level. These results basically indicate that information on new crop progress and conditions contained in the USDA CP reports generally changes the supply expectations of market participants, as they are reflected in greater movements in the future markets prices (Lehecka, 2013).

Moreover, when announcement effects were tested for two groups of reports, the one report only consisting of crop progress information and the other consisting of crop progress and conditions information. The results are illustrated in Table 4.2 above, and for the report with just crop progress information, return on variance on report release days is similar to pre-/postharvest report day variance for both corn and soybeans. For the report with both progress and conditions information, the return variance on report release days is 1.66 times greater than the pre-/post report day variance for corn, and 1.58 times greater for soybeans. The increase in return variance on report days is significant, at 1 % level.

The null hypothesis that return variability for report days and pre-/post report days is equal could not be rejected. The implication is that only condition information in CP reports has impacts on futures market returns. The conditions report is a direct assessment of the overall status of the crop throughout a growing season. It reflects the effects of all variables on the condition of a crop, including planting date, temperature, and precipitation. Therefore, the presented results suggest that changes in crop condition tend to change supply expectations of market participants, and that the condition information included in USDA's CP reports is valuable to market participants (Lehecka, 2013).

4.4.2 Importance of Agricultural Estimates

It is of importance that statistical information is available on the area planted, production, stocks, prices, and income, as this leads to a smooth running of government programmes, and this kind of information is also required for planning and administering federal and state programmes (USDA, 2013).

The orderly flow of goods and services is ensured by regular updates of information along the agricultural value chain. Timing and reliability is of vital importance, as these allow for a stable economic environment, with minimal uncertainties and risks associated with production, marketing and distribution of commodities (USDA, 2013).

Everyone in the agricultural field requires this sort of information to make decisions. Farmers need this information for production and marketing decisions. Transporting services, warehouses, storage companies, banking and lending institutions, commodity traders, input suppliers and processors rely heavily on this kind of information to make decisions and plan their marketing strategies (USDA, 2013). Analysts use statistical information and projections of upcoming trends and interpret the economic implications thereof (USDA, 2013).

4.4.3 Importance of CP Reports

The importance and the impact of planting progress are depicted by the price Figure 4.3 below. The sharp move higher on Monday, 5 May 2012 (1st red circle) was when the USDA announced that only 5 % of maize had been planted, compared with the 5-year average of 31 % and the previous year's 50 %. Again, but slightly from a different angle, on Monday, 14 May, although the planting progress still only stood at 28 %, the weather cleared up and there was a real chance for significant progress. This was the main reason for the market trading lower in that week.

Figure 4.3: CME December 2013 daily corn (maize) price.

Source: *CMEGroup*, 2013

Due to greater international commodity trading, volatility in agriculture has become more important to both producer and consumer. According to Geyser and Cutts (2006), the role played by international markets in price determination in countries such as South Africa makes it necessary to closely determine and evaluate volatilities in commodity prices. They go on to mention that production of commodities is fixed in the short run, which implies that farmers are exposed to price changes from planting till harvest time, hence the existence of volatilities. South Africa became more exposed to grain price volatilities after the deregulation of agricultural commodities market in 1997, and farmers had to adopt a new way of trading through the commodity derivatives market.

A study by Jordaan *et al* (2007) recognised the importance of price volatility to farmers, which led them to investigate the volatility in cash prices of the crops that trade on SAFEX. Since the July futures contract is the closest contract to the harvest period for maize in South Africa, they analysed the volatility in the price of the July futures contract, rather than the spot price. Price volatility has a high impact on profit volatility (Jordaan *et al*, 2007). The most important reason for quantifying price volatility is the variability in prices among commodities, for which a decision in investment and production is made, and which in a developing country such as South Africa means that negative price shocks have a greater negative impact on economic growth (Dehn, 2000), which is one of the components of the triple bottom line. The triple bottom line is about the value that a firm creates and its impact on society and the environment, and it is intended to promote sustainable development (O'Carroll, 2004). It can therefore be said that price volatility has an impact on the triple bottom line, as well as on sustainability.

In their study, Jordaan *et al* (2007) found that the release of new information on growing conditions had a positive impact on the volatility in the price of the July white maize contract, and it was determined that it is influenced by the release of the report of the crop estimates committee meeting, with the other influence being the WASDE report on world supply of demand of maize. Due to secrecy surrounding certain reports, people's anticipated reactions are usually accessed through price spikes.

4.4.3.1 Data uses and user's meetings

Producers, agribusinesses and traders use both state- and US-level progress and condition estimates to assess current growing conditions and to reduce or eliminate the risk of doing business. This information is also used for planning, decision making and research by federal, state and local government agencies, educational institutions and agricultural economists (USDA, 2013).

The USDA holds data users meetings annually, in order to update users on any changes and to see feedback on current programmes (USDA, 2015). These meetings have been going on from 2005 to date. Through the years, CP reports have come under scrutiny and during the 2010 data users' meeting, it was reiterated how important it is, when a data user suggested that the sample used needs to change because, if a state drops 10 bushels, the index of the conditions nevertheless drops by 1 %. Another issue that came up over the years was the fact that some stakeholders felt that the CP report was like a beauty contest where people just drive by fields and make up opinions without being directly involved. The response from NASS was that, statistically, their results are valid considering their sample size, which is over 2000 respondents in various areas and with different skills and qualifications. The benefit is that they are volunteers and did not need to be paid for their services, which is a bonus, considering scarce public resources. This response, and considering the many years that a CP report has been in existence, clearly indicates the overall importance of the CP report and how much people value it (NASS, 2015).

4.4.3.2 Methods and frequency and special features

During winter months, no formal survey is conducted; field officers only track farm activities during routine contacts within industry, thereafter a summary report is submitted in advance of the crop production report (USDA, 2013). CP surveys are conducted weekly from early April until late November, and from December through to March, field offices report on agricultural activities monthly.

The data collected from the CP survey is then transformed into graphs for major commodities, showing a comparison of accumulated progress through a particular phonological stage for the current year to the previous year and the five year average (USDA, 2013). The CP is reprinted weekly, together with the weather and crop bulletin which is compiled and distributed by the NOAA/USDA agricultural weather facility. This information is also published in the form of crop summary narratives in the monthly Crop Production Report (USDA, 2013).

This chapter focused on the benefits of a Planting Progress Report. The study done by Lehecka (2013) helps emphasise the importance of this particular report in the USA and the benefits it brings about. The conclusion to that study was that CP reports provide valuable information to corn and soybean futures markets. Secondly, only crop reports with conditions had an announcement effect in the variance, implying that the combined effect of crop progress and condition has more of an impact in the market. Finally, the market impact analysis strongly suggested that prices react quickly and move in the expected direction.

4.5 Summary

Chapter 4 underwrites the study's first and second hypothesis, namely "leading grain and oilseed producing countries benefit from the publication of a planting progress report" and "the South African grain and oilseed industry will benefit from the publication of a planting progress report."

The first part of this chapter focused on the second hypothesis, concentrating on the South African grain and oil seed industry. It was established that the industry has two major sources of information about grains and oil seeds, being the CEC and SAGIS. The CEC comprises a number of institutions that do not have any vested interests, and these representatives put together reliable estimates on a monthly basis. The CEC reports have a vast number of users and it is anticipated that these would be the same users for the proposed crop progress. The need for a planting progress report simply arises owing to the gap in information on the production calendar. The procedure followed by the CEC in the compilation of these reports, step-by-step, was analysed. This is important because it helps us understand the procedure that could be used for the proposed crop progress report. SAGIS services four industries: maize, oilseeds, winter grains, and sorghum. Post-harvest information is provided, such as monthly data, weekly bulletins, producer deliveries, weekly imports and exports. On their website, they also make available other sources of information from other institutions, such as CEC crop estimates and food prices from Statistics South Africa. These two sources have their merits; however, the reality is that the CEC provides pre-harvest information while SAGIS provided post-harvest information. Both these sources of information where assessed, in terms of their methodologies, as to how the current resources could be used to complement the proposed planting progress report.

The second part of the chapter focused on the first hypothesis, adding to Chapter 3. We concentrated on the importance of agricultural estimates, as well as CP reports, in the terms of impact on price volatility. This was to shed light on the importance of timely and accurate information and the potential it has to reduce price volatility.

CHAPTER 5

NORTHWEST PILOT PROJECT

5.1 Purpose

The purpose of this pilot survey was to determine the responsiveness of farmers and other respondents towards the idea of a planting progress report. With responsiveness, the assumption will be made that people perceive that they will benefit from the outcomes. This will help in gaining insight, as well as experience, on how things are done and how they may be improved.

5.2 Background to NWK

NWK Ltd and their producers served as a pilot project. This ex-cooperative is located in the North West Province of South Africa where the majority of summer grains are produced. NWK provides a vast array of services. They have a silo service providing storage and handling, while the grain trade department provides professional marketing and price risk management knowledge to producers, millers and other grain buyers. They offer agronomic, livestock and agric-economic advisory services through their agricultural extension services, with retail services that offer customers high quality inputs and customer goods, while NWK liquid fertiliser supplies customers with liquid fertiliser. The finance department provides customised financial packages for their customers. The CentriSure brokers supply insurance at the most affordable rates (NWK, 2015).

5.2.1 Characteristics

Figure 5.1: NWK, Pilot project participants

Source: NWK, 2013

At the time of the survey, NWK had approximated 1500 producers, of which 327 producers participated in 27 regions, and 36 silo managers in 36 regions. The survey participants were divided into three categories, with the main focus group being the producers, and two control groups consisting of the silo managers and agricultural advisors. The producers were sub-divided on a regional silo basis (27 regions). An initial letter was composed and mailed to prospective producers, explaining what the project was about. Only the maize and sunflower seed producers were targeted. In the pilot project, the questions to these participants were uncomplicated and limited, and the basis of communication was through SMSs.

5.3 Pilot definition

The pilot project was launched on Monday, 17 December 2012 and closed on 23 January 2013. The following SMS went out to all the producers and silo-managers, via an internet bulk SMS portal, to inform them again about the project:

> "Planting Progress Report: Pilot Project of the University of Pretoria and Department of Agriculture in a plant progress report. NWK letters with full information about this will be emailed to you. Surveys are conducted weekly by SMS and you participate by answering to the SMS. If you do not want to take part in this, reply "Stop".

A follow-up SMS was then sent out, specifically asking the producers and silo owners to reply with their planting progress for the week:

> "Planting Progress Survey – please indicate what you have planted until Sunday, expressed as a % of your intentions. Choose reply key then only the % white maize separated by a comma and then the % sunflower e.g. "17, 23" and then select "send". Feedback follows via SMS. Thank you for your participation – Dept. Agriculture & University of Pretoria."

The participants were able to reply by means of the provided bulk SMSs inbox and the data was collected from the responses. As noted above, the survey was done by cell phone, which is still unique in South Africa and in the agricultural industry. Many producers have in the last few years upgraded their cell phones and replaced them with smart phones. This not only means that they have better access to technology, but also that they are more willing to make use of this technology. Therefore, receiving a survey question on their cell phone and replying came naturally to many. It was amazing how quick the response time was after producers received the survey question early on a Monday morning. At least half of producers (of those intending to respond) did so within the first hour. By lunch time, 80 % had responded. This is unheard of and could be compared with the national crop estimate survey where several producers still receive questionnaires through regular mail (although many have also upgraded to email).

Following from this, SMS responses were automatically captured in an electronic database from where they could be exported. The data then had to be manually processed. The interpretation and compilation of a basic report is fairly simplistic, although additional analysis does require a higher degree of experience. Nonetheless, due to the benefits of cell phone technology, it was possible to release the basic results within 36 hours after the survey question was sent out.

SMS technology is very cost-effective. An ordinary stamp and envelope costs around R3.00, compared with an SMS which costs around 30 cents. The survey was also conducted on the basis of no cost to the producer, other than the cost of the SMS which he or she sent in reply to the survey question. Compared with other projects, the costs for this project were extremely low.

5.4 Survey period

The time frame of the pilot project was from the 17th of December 2012 and ran for the duration of four weeks, until the 23rd of January 2013. All required resources were provided by the University of Pretoria. The impact of a failed attempt at conducting the pilot project would be that stakeholders might not be convinced about the need for this planting progress report. This project ran under the supervision of Dr André Van der Vyver with the support of his colleague, Ms Almarie Nordier, and Ms Rona Beukes at DAFF; Mr Danie Smith, Head Grain Trading at NWK Ltd, assisted and supervised the project at NWK Ltd. The pilot was conducted during planting season until what was deemed to be the end of the season, in January. The practitioners' attitude toward the technology for the pilot study was overwhelming, and as many people use cell phones nowadays, this therefore made it convenient for them. Although it came at a cost (standard SMS rates applied), for many, it seemed worth it.

5.5 Planned evaluation of the pilot project

This section discusses how the project was planned, and the data collected and analysed, as well as the variables measured and the expected success rate.

5.5.1 Success criteria

In order for the pilot project to have been considered successful, a response rate of 20 % or more was considered preferable.

5.5.2 Variables to be measured

Only two variables were measured and compared with intentions: the percentage rate of progress of white maize and sunflower seed, separately, compared with intentions to plant. As mentioned in Chapter 4, this particular report of intentions is released by DAFF before the planting season.

5.6 Threats to validity of pilot results

Due to the nature of the survey, there was limited communication with the producers, and therefore positive perceptions had to be assumed by virtue of the response rate to the survey. After the first SMS, a few participants immediately replied “stop”, but these were limited to about 6 %. It also contributed to some technical errors, since all respondents had previously agreed to participate. Due to the limited time available, no effort was made to establish the real reason. The first survey response had already achieved a desired response rate, at 21.1 %. The response from the silo owners was limited, but once personal telephonic contact was made reminding them about the project and explaining to them that no confidentially clauses would be breached, they were more than willing to participate.

5.7 Define the mechanism for doing the evaluation of the pilot

The data was collected separately for each silo region. An average percentage of the producers’ feedback was used in the region, along with the silo owner. The data was exported to an Excel file. It was then manually allocated to the different regions and silos.

The agricultural advisors who served as a control sample were telephonically contacted as well, to ask them more specific questions on the feedback or the lack thereof from producers and silo owners

Table 5.1: Project plan

Assignment	Phase	Start Date	Person responsible	Labour (Person/hour)
Getting stakeholders on board	Call and set up meeting	24 November 2012	Andre van der Vyver	2-3 hours
Getting NWK on board	Call and propose project	02 December 2012	Andre van Der Vyver and Rona Beukes	2-3 hours
Contact NWK producers	Call and propose the intentions of the project	Dec 03-Dec 07, 2012	All available project coordinators	5 days
Data capturing and analysis	Get data from receiver inbox and transfer to excel	Every Monday for 10 weeks	Almarie Nordier	5-6 hours
Report back	SMS results to respondents	Every Tuesday for 10 weeks	Almarie Nordier	1 hour

Source: *Own data*, 2013

5.7.1.1 Description of project plan

The project tasks included:

- Compiling lists of respondents per silo
- Informing them on the purpose
- Sending an SMS via a bulk SMS portal
- Receive response, download into Excel
- Process and analyse data
- Send response back to producer.

5.7.2 Resources

Respondents were required to respond through SMSs. SMS technology is very cost effective. There is no 'additional charge' to the producer, other than his or her normal SMSs charge (not like some competitions). Although the response SMS data was automatically captured, it had to be manually processed. The interpretation and compiling of a basic report requires some insight into the work done.

5.7.3 SMS cost

Approximately 500 SMSs were sent out to the targeted surveyed groups, once a week, for 10 weeks at a cost of around 45c/SMS. Ideally, a response of 100 SMSs (20 %) was to be expected, to the senders of which the survey results were again sent. However, in the first few weeks, everyone did receive the results, which generated greater cooperation. The total estimated cost was R4 500 over the duration of the project.

5.7.4 Human resources (junior level)

For the capturing of data, verification and re-sending of results, it was proposed that University of Pretoria would appoint a post-graduate student on a part-time basis. Included in the hours, would be the task of responding to queries from producers, or if the data had some or other problem, verifying with the producer. The costs were calculated for two days a week, for 10 weeks at R70/hour, giving an estimated cost R11 200.00.

5.7.5 Human resources (senior level)

Several hours were required from senior management to coordinate the project. Some meetings have been conducted. Ideally, a detailed report will have to be compiled. Furthermore, report feedback could be simplistic, by way of two percentage numbers only, or in much more detail, as seen in the Argentina example, above. This could be again reviewed at a future date. Initially it was proposed that all parties would cover their own cost.

5.8 Results

Approximately 320 producers were identified in 27 silo regions. Initial responses to the SMSs were slow, but after additional contact was made with producers via telephone to explain the project and as the results were made available, producer interest grew. Figure 5.3 below depicts the growth in response.

Due to the lateness of the rain during that season, only four weekly planting progress surveys were conducted. A fifth question survey was added after planting had been completed in order to compare actual hectares planted with that of the previous season. Results were then compared with the DAFF survey before the release of Crop Estimates Committee's 'Preliminary Area Planted' report on 24 January 2013. The fact that the results corresponded well was positive, since it demonstrated that producers might be ready for adopting new technology.

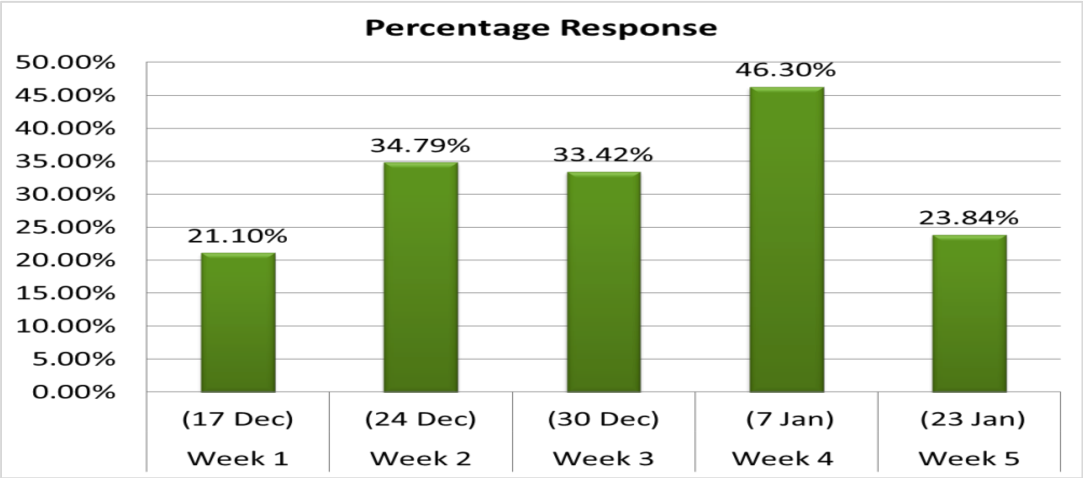

Figure 5.2: NWK, percentage response.

Source: *Own data*, 2013.

Table 5.2: Crop planting progress survey results

SILO	Silo owners		Farmer		Advisor		Average	
	Maize	Sunflower	Maize	Sunflower	Maize	Sunflower	Maize	Sunflower
BARBERSPAN	90	60					90	60
BIESIESVLEI			100	100			100	100
BLAAUWBANK	70	50	100				85	50
BODENSTEIN	100	70	100				100	70
BOONS								
BOSCHPOORT								
BOSSIES	91	60					91	60
BUHRMANNSDRIF			100	100			100	100
COLIGNY			66.67	66.67			66.67	66.67
DELAREYVILLE	100	90	99.5	71.5	90	65	96.5	75.5
DERBY	100	100	100	100			100	100
EXCELSIOR			98.75	57.5			98.75	57.5
GERDAU	90	85	100	58.33			95	71.665
GEYSDORP	97	68	100	0			98.5	34
GROOTPAN 1								
HALFPAD	100	98	100	100			100	99
HIBERNIA								
KAMEEL								
KLEINHARTS	99	90	100	100			99.5	95
KOSTER	92	54	100	100			96	77
LICHTENBURG 3								
LICHTENBURG 5	93	80	97.5	50	95	90	95.25	65
LOTTIE HALTE								
LUSTHOF			100	92.5			100	92.5
MADIBOGO	80	90	100	16.5			90	53.25
MAREETSANE			86.67	40			86.67	40
MIGDOL	50	40	90.83	63.33			70.415	51.665
NOOITGEDACHT								
OPPASLAAGTE	99.8	64.1	97.4	75.6			98.6	69.85
OTTOSDAL	95	90	100	100			97.5	95
ROSTRATAVILLE	100	99	100	100			100	99.5
SANNIESHOF	95	55	100	86.36			97.5	70.68
SYFERBULT			99.5	99.5			99.5	99.5
SWARTRUGGENS	80	0					80	0
TAAIBOSCHPAN			90	55			90	55
VERMAAS	97	80	89.21	70.36			93.105	75.18
Average	90.940	71.155	96.6412	74.05	92.5	77.5	93.360	74.235

Source: *Own data*, 2013

5.9 Interpretation of survey results

Table 5.2 indicates a spread sheet of aggregated data per region for the different respondents. The table shows planting progress for maize and sunflower for one week. On a regional basis, one of the shortcomings was that more emphasis could be placed on weighting the response, based on the importance of a specific region in the production of a particular product, such as white maize. Also, in the important regions, slightly more responses would add value and either more marketing is required to obtain a higher response rate, or more producers would have to be encouraged to participate. On a national basis, a process of conducting regional surveys and then accumulating the results might be cumbersome. It was recommended that a non-probability survey recently done by SIQ on behalf of DAFF, which covers about 2 000 producers on a national basis, be used, rather than trying to convince agribusinesses to participate in the way that NWK did.

With this response rate, it is a clear indication that producers and silo-managers have a need to receive information on the planting progress in their region. It also gave additional information that in some areas producers only started to plant at a later stage because of the late rainfall. This will also give an additional benefit to the participating producers to inform them about their region and whether all producers are running late, or only they are themselves. If expanded on a national basis, the value would increase tenfold. Cell phones seem to be the way to go in the future. Looking at the future, planting dates could even be linked to yield potential, and so forth.

5.10 How to better improve methodology

It is clear from the results that there is a gap in the grain and oilseed market, and we have the means and ability to provide a platform for all market players to have an equal opportunity to share accurate information. The survey was done on a closed basis, but it later became known and we received requests from private companies to be included. Although we encountered difficulties over the holiday season, most of these issues can be overcome in future. Personal telephone calls are from time-to-time necessary, just to touch base with respondents and to keep them encouraged. More specialists are required for comparison and verification of data and data needs to be weighted on a silo basis.

5.11 Summary

Based on the evidence collected from grain producing countries across the world, but especially the US, there is merit in compiling a planting progress report for South Africa, hence the underlying hypothesis “The South African grain and oilseed industry will benefit from the publication of a planting progress report.” It can be statistically proven and quantified that markets do react to the release of planting progress information. The survey could be done on a regional basis and then aggregated. It will be more accurate, but will cost more and require more input and cooperation with agribusinesses in the areas. The success and potential of utilising cell phone technology should not be under estimated. It will probably be easier and more cost effective to do a national non-probability survey.

The volatile South African grain and oilseed prices could, in part, be addressed by a more transparent market. This will be beneficial to users as there will be more information made available, with a more transparent market, making prices less volatile. This would be an important tool in making market information more speedily and accurately available, allowing better access for those who do not have. A proviso, as in any other report of this nature, is that the integrity of the data should be above questioning. With discussions still pending on the merit of the project on a national basis, producers, comprising one of the key stakeholders in this instance, will ultimately have to decide whether they view such a report as adding value and warranting their support.

CHAPTER 6

PRICE VOLATILITY IN THE SOUTH AFRICAN WHITE MAIZE MARKET

6.1 Introduction

With respect to identifying price volatility, studies done by Jordaan *et al* (2007) and Monk et al (2007) extensively determined the factors that cause volatility by testing them. From their studies, there is no doubt that there is price volatility in the grain and oil seed market of South Africa; however, this differs for different commodities, as can be expected. For the purpose of this study, we will focus on price volatility as applied to white maize futures prices traded on the Johannesburg Stock Exchange (JSE)/Commodities derivatives market. Ideally, we would like to test the price movements caused by the proposed planting progress report, but because it is not yet available in South Africa, the next best alternative would be the CEC reports. A similar study has been done in the US, as has been mentioned in Chapter 4 (Lehecka, 2013). She tested price movements due to the planting and crop conditions reports released by the USDA.

6.2 Problem statement

According to economic theory, competitive markets are classified as those with perfect information where prices are determined by supply and demand; however, this is regrettably not the case for the grain and oilseed markets. Consequently, this causes much opportunistic behaviour by speculators and other role players in attempts to manipulate prices to their advantage. Transparency in markets is important and, as a result, the grain industry requires a platform to keep all role players abreast of the latest developments. Some reports are already being published, but they are inadequate to cover the entire production calendar in that there is still room for opportunistic behaviour in the industry. A planting progress report will address some of the important needs for more frequent market information, especially between pre- and post-harvest information that is currently available.

6.3 Research question

As has been stated in Chapter 1, in focusing on the final objective of this study, we would like to determine the benefits of such a report for the South African industry. The rest of this chapter is subdivided into two sections; section A, in which we test for differences in means for average price movement on the day of the report release for CEC reports; and section B, in which we look at intraday price movement on release days for CEC reports.

6.4 Methodology

6.4.1 Section A

For the purpose of this section, we will only use July white maize contracts. This contract is by far the most popular and highest volume traded contract. Daily SAFEX price data was obtained from JSE/SAFEX since 2000, which is the period from which the CEC reports began to be released. Only price data from trading days was used, from January 2000 to July 2015.

Calculations were made based on the four major release days for the Crop Estimate Reports: (I) first production forecast in January, (II) secondly revised intention to plant (which was stopped in 2009), (III) preliminary area planted released end of September, and (IV) intentions to plant for the following year, in October. These four reports are deemed to be important as they are released at significant times during the production calendar and hence we may expect that the information they contain would cause movements. Firstly, for each of these dates we calculated the average percentage price movement 15 days before the release, and 15 days after the release day of the report, as well as movement on the day after the report was released. CEC reports are released in the afternoon when the market is closed, and any immediate impact therefore reflects on the following day's prices. In order to show the impact of the report on the market, the price movement should be higher on the day after the report than on any number of days before and after the release of the report. It is not unreasonable to assume that for the four reports of pre- and post-release data are independent and that a natural pairing of the data exists (Mack et al, 2005). Firstly, we test if the means are equal; we would like to check if there was a rise in the mean of prices on the day of release, compared with 15 days pre- and post-release. This procedure is done for the four mentioned crop estimates reports. The hypothesis is as follows:

H_0: The difference in means = 0

H_1: The mean on the day of report release is greater than 15 days before release and 15 days after release.

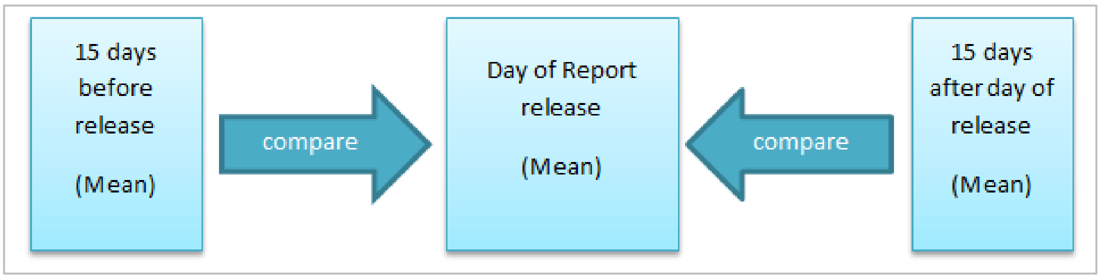

Figure 6.1: Comparison of means

Source: *Own data*, 2016

However, there are shortcomings to this method; the second intentions report has limited data from the year 2009. The other issue is that the sample size is small; the three reports, first, third and fourth, have 14 data points and the second one only has 8. Due to these shortcomings, it is expected that the results may be inconclusive and therefore a second method is used in section B, which is considered to offer additional insight into the volatility.

6.4.2 Section B

For the purpose of this section, we will again use July white maize contracts. It has been mentioned before that this contract is more popular, with high volumes traded. Daily price data was obtained from JSE/SAFEX for the years 2014–2016, with the rationale that recent years will exhibit the most prevalent trends in trader behaviour, thus being the motivation for examining them.

Observations were made based on all release days for the Crop Estimate Reports, but the focus for this paper is on the three major release days: (I) first production forecast in February, (II) preliminary area planted end of January, and (III) intentions to plant for the following year in October. In order to mitigate outside influences, such as the exchange rate and international price movements, intraday price movements were analysed. The differences between the highest and lowest prices for each day were captured, with the rationale being that periods of increased volatility are characterised by more extreme intraday price swings. To analyse the relative volatility between trading days, a centred moving average standard deviation (CMASD) was constructed, derived from the intraday price ranges discussed above.

The CMASD uses the intraday price movements of a predetermined number of trading sessions on either side of the day in question. Figure 6.2 serves to illustrate the process of using a 5-day CMASD as an example. The standard deviation for each 5-day period is calculated to produce a time-series graphic for visual analysis.

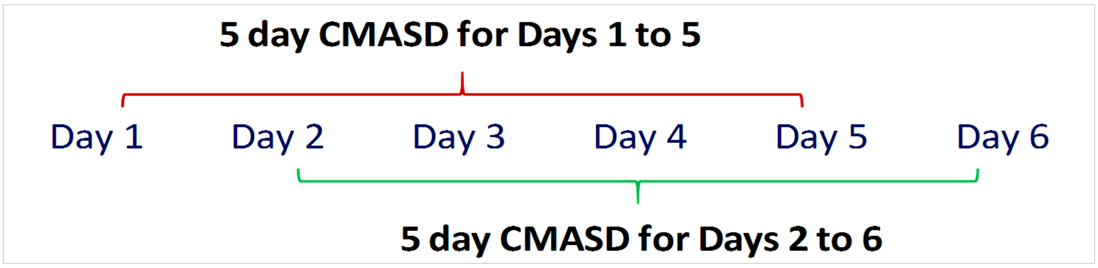

Figure 6.2: Calculations for centred standard deviations

Source: *Own data*, 2016

In order to show the impact of the report on the market, the price movements and intraday volatility should be higher in the period immediately before and after the report, as market participants first position themselves according to their expectations of the report and then reposition themselves according to the report's actual data released. It is not unreasonable to assume that for the four reports' pre- and post-release data are independent and that a natural pairing of the data exists (Mack et al, 2005). The higher the volatility is, the higher the standard deviation is, and thus it can be depicted graphically, illustrated by spikes in the time series.

6.5 Data analysis

Analysis was carried out using Excel software. Using the average function, we get the average price change for the last 5 years of the 15 days price averages in section A, and then we use the standard deviation function to get the 5-day and 11-day centred moving average standard deviations in Section B.

6.6 Results and Discussion

6.6.1 Section A

Comparison of means for intentions to plant and revised intentions to plant reports

Report / Year	Intentions to plant (September)			Revised intentions to plant (November)		
	15 days Before	On the day	15 days After	15 days Before	on the day	15 days After
2000/2001	0.78	0.64	0.71	1.24	1.23	1.11
2001/2002	0.74	1.71	1.49	2.54	2.74	2.43
2002/2003	0.68	1.97	0.95	0.93	1.27	1.63
2003/2004	0.98	0.41	1.55	1.09	0.41	2.15
2004/2005	1.32	0.79	1.59	1.59	0.28	2.5
2005/2006	0.99	1.26	1.07	1.39	4.69	1.74
2006/2007	0.81	0.46	1.30	1.49	1.52	1.54
2008/2009	1.54	0.54	0.66	1.06	2.77	2.15
2009/2010	1.72	2.11	1.62	0.00	0.00	0.00
2010/2011	0.38	0.00	0.71	0.00	0.00	0.00
2011/2012	1.51	0.55	1.34	0.00	0.00	0.00
2012/2013	1.45	1.11	1.37	0.00	0.00	0.00
2013/2014	1.52	3.18	0.74	0.00	0.00	0.00
2014/2015	1.37	0.40	2.96	0.00	0.00	0.00
***Mean** (5 years)*	***1.25***	***1.05***	***1.42***	***0.00***	***0.00***	***0.00***

Source: Own data, 2016

Table 6.1 shows the output for calculations of *intentions to plant* and *revised intentions to plant* reports. From the intentions to plant report, the last five years were averaged, and comparing the means, we can see that the mean for 15 days before and 15 days after the report are higher than on the day of release. For the revised intentions to plant report, we are not able to get the average, since these reports stopped being issued over five years ago.

Table 6.1: Comparison of means for Preliminary area planted and revised area and production estimate reports

Report / Year	Preliminary area planted (January)			Revised area and production estimate (February)		
	15 days Before	On the day	15 days After	15 days Before	On the day	15 days After
2000/2001	1.57	1.71	2.60	2.71	1.34	0.92
2001/2002	0.00	0.00	0.00	1.83	0.99	2.02
2002/2003	1.71	0.85	2.21	2.46	1.37	2.12
2003/2004	2.57	4.87	2.13	2.22	0.29	2.64
2004/2005	3.70	1.33	3.02	2.09	2.24	2.16
2005/2006	2.39	1.97	2.56	2.01	4.50	1.34
2006/2007	1.76	1.32	1.85	2.69	0.67	1.52
2008/2009	1.75	2.75	1.44	1.49	0.92	1.03
2009/2010	1.76	0.09	1.46	1.71	1.24	1.10
2010/2011	0.88	1.59	0.26	1.10	2.55	1.00
2011/2012	1.35	1.12	1.21	1.25	0.67	1.47
2012/2013	0.13	0.05	0.44	0.81	0.39	1.21
2013/2014	0.74	1.00	1.20	0.96	2.30	0.69
2014/2015	3.03	3.39	1.44	0.85	0.24	1.64
Mean(5 years)	***1.23***	***1.43***	***0.91***	***0.99***	***1.23***	***1.20***

Source: Own data, 2016

Table 6.2 shows the output for *preliminary area planted* and *revised area and production estimate reports*. From both reports, the last five years were averaged. Comparing the means for *preliminary area planted*, we can see that the mean of the days of release is higher, compared with the 15 days before and after the report. For *revised area and production estimate* report, the mean for the day of release is also higher than 15 days before and after the release of the report. In comparison with the first two reports, the last two reports have more significance, since they are released at the time when planting has just been completed.

As has been mentioned in the methodology section, the shortfall of this method used in Section A is that we do not have enough data, therefore making the time series too short and other market influences have not been factored in, which makes it difficult to isolate the actual effect of the CEC reports on prices. However, Section B is more appropriate, since we have removed all other factors and price movements are graphically visible on the day of release. It is recommended that since the data is inconclusive, it would be better for further studies to spend more time on analysing the data and for more variables to be included the analysis. However, Section B is more appropriate, since we have removed all other factors and the price movements are graphically represented

6.6.2 Section B

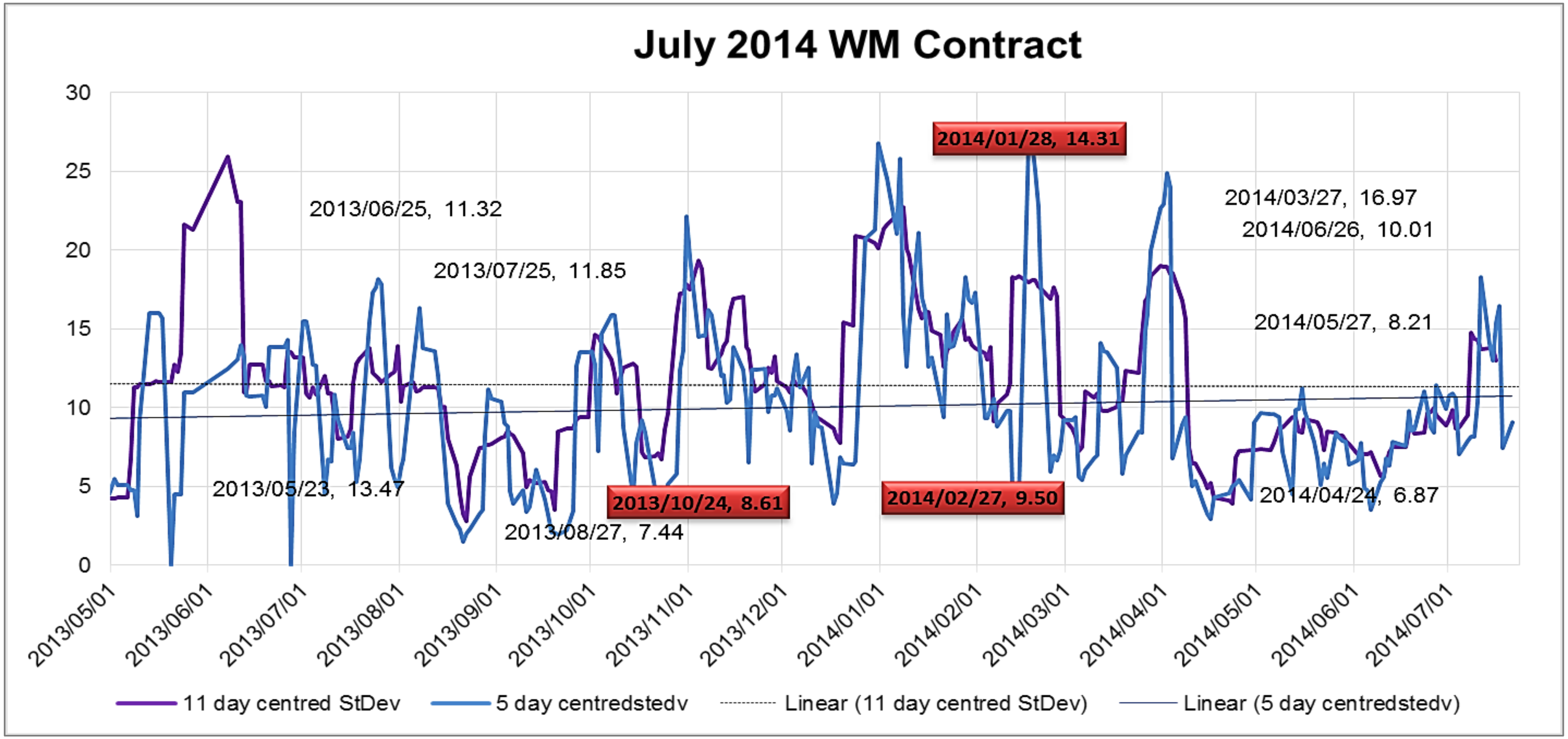

Figure 6.3: 5 day and 11 day centred standard deviation for intraday price volatility in 2014.

Source: *own data, 2016*

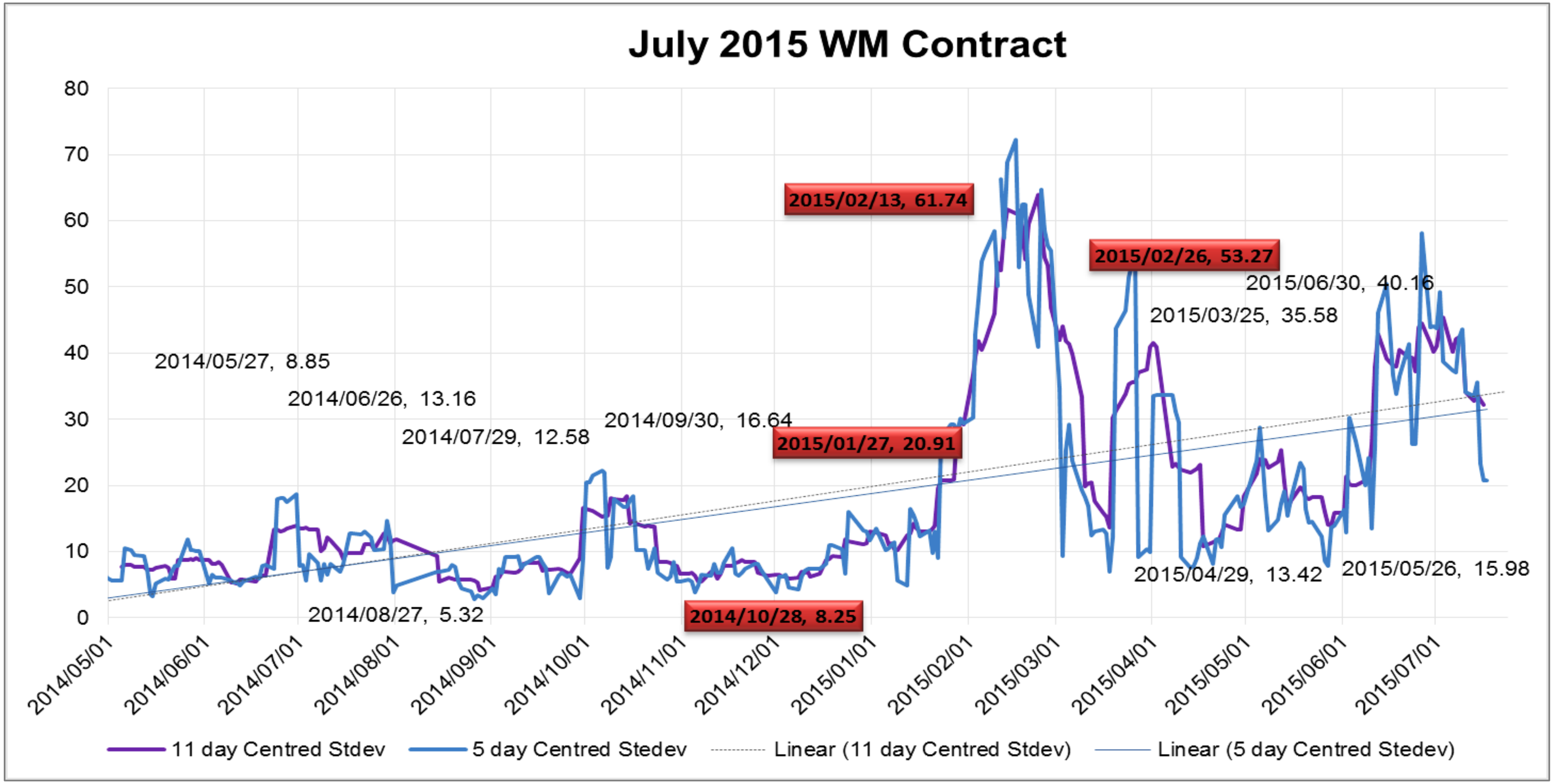

Figure 6.4: 5 day and 11 day cantered standard deviation for intraday price volatility in 2015.

Source: *own data, 2016*

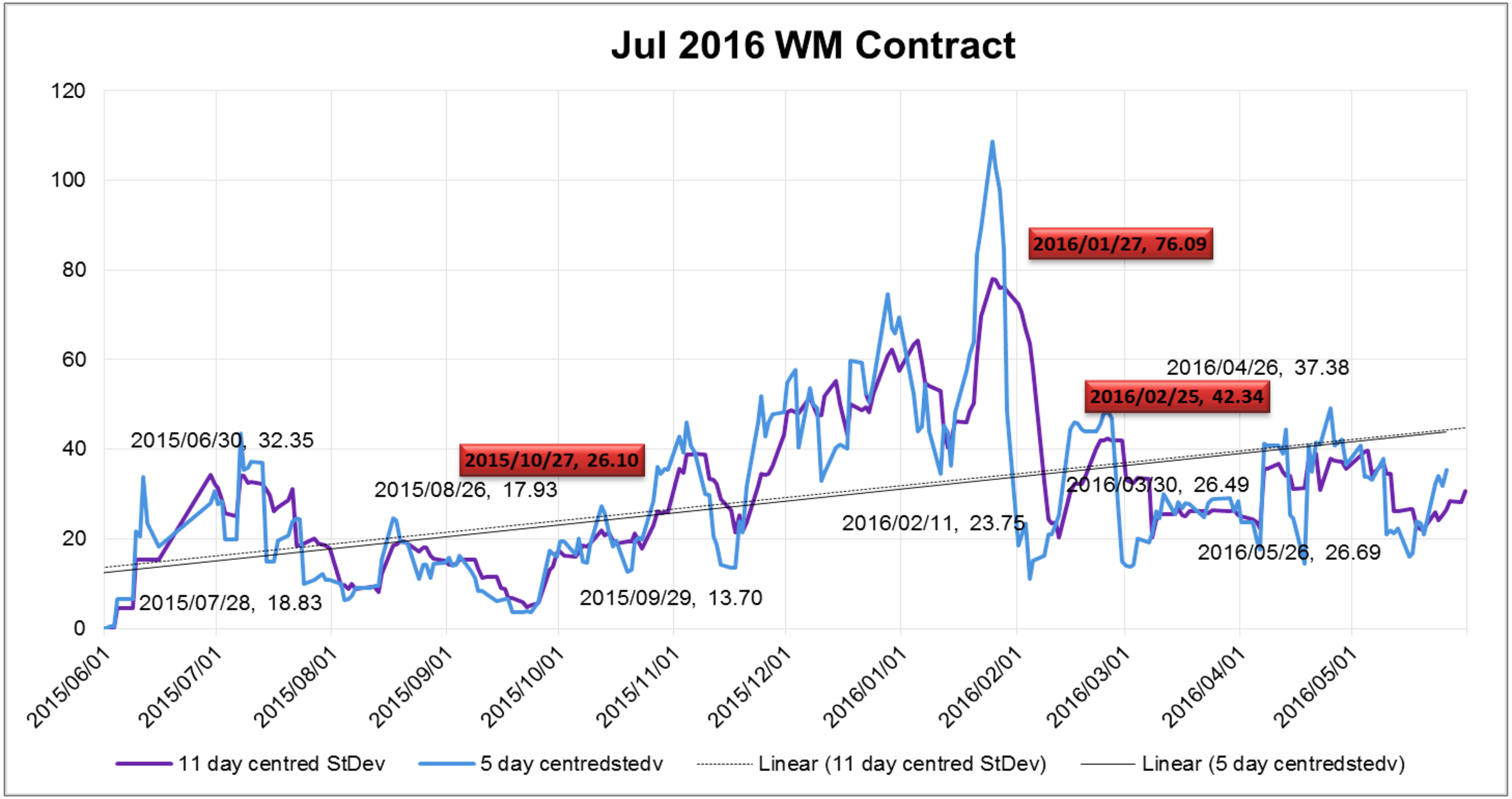

Figure 6.5: 5 day and 11 day centred standard deviation for intraday price volatility in 2016

Source: *own data*, 2016

Figures 6.3, 6.4 and 6.5 show price fluctuations for the years 2014, 2015 and 2016, and represented on the graphs are both 5-day and 11-day centred price movements. All three graphs mentioned above, show similar fluctuations however the 5-day day centred price movements is usually higher than the 11-day centred price movements, this is because a longer period of time allows the market to settle. The peaks reflect high standard deviations and therefore high price movements. It is evident that the highlighted dates on the graphs, which are report dates for the three major reports mentioned, correlate with the peaks on the graphs, especially those for the preliminary area planted reports released in January, and the revised area and production estimate reports released in February. These movements show people’s reactions through price movements, especially for important release dates like those highlighted on the graphs. It is assumed that the data contained in the reports is reliable, because the market quickly corrects itself after the report is released. Since the current reports are already valuable, it would be more beneficial for South Africa to have a planting progress report on a weekly basis which we expect would show less price movements and allow price fluctuations to become corrected quicker.

6.7 Conclusion

It can be concluded from the graphical representations that, in general, there is higher volatility on the day of release than on days before or after. This means that the South African market, similarly to the US market, does react to the data or market information released. Although there is no planting progress report available yet in South Africa, it likely that the market would react in the same way. Ultimately, any additional information of release potentially has value; but information with more value makes the market move or corrects itself. All information contributes to market transparency and in the longer term prevents extreme movements and negative impacts, since the market was uninformed. It can therefore be agreed that a planting progress report would be beneficial and of much value to the market, especially when it is accurate.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 Conclusion

The objective of this study was to understand the potential benefits which a planting progress report would have on the South African grain and oilseed industry. We determined which countries compile the proposed planting progress report and the benefits thereof. Furthermore, we examined whether such a report could be compiled in South Africa, and the methodology which would be best suited.

The core problem that was identified was a gap in the production calendar; this simply means that there is less information available to keep stakeholders informed about what is happening in the market, thus making it difficult to make timely decisions, which then ultimately has an impact on profitability. In order to be competitive, all markets need to be efficient and transparent. Economically, it is important for all role players to have the same information, as often and as timely as possible. We see an emphasis in the rapid increase of information technology as a means of communication in the developing world; this has become one of the most convenient sources of information dissemination.

In endeavouring to substantiate the first hypothesis, namely "the leading grain and oilseed producing countries benefit from the publication of a planting progress report", an inquiry on international practices showed that all of the major grain and oilseed producing countries have been producing their reports for years and they deem them important, as time and money is still spent on them. The most important aspects are that the reports should be reliable, accurate and valuable, and they should have market value, because if they do not follow the standard, they would cause rather more chaos than a stability in prices. From the study that we used by Lehecka (2013), it is evident that in the US, CP reports have an impact on the market, although it was ascertained that they have more of an impact if they are coupled with conditions. This bears an important implication for the proposed crop progress report in South Africa; however, I am of the opinion that the industry should rather start with producing the crop progress alone, and after some time, conditions can be added.

The second hypothesis involved endeavouring to verify that "The South African grain and oilseed industry will benefit from the publication of a planting progress report." From the literature, it is evident that price fluctuations have had an impact on role players in the industry, which gives rise to the need of a solution. Considering how other countries, and especially the US, have production reports that fill the production calendar, it is clear that South Africa is lagging behind. On the upside, we have already made great strides in establishing the two most prominent sources of information, which are SAGIS and CEC. These are reliable, accurate and valuable sources of information, and the only problem is that the industry needs more regular information sources between the gaps left by these two sources. The current number of respondents used by CEC for the Crop Estimates is quite advantageous as suiting the sample size for the proposed report, and this means that not a lot of new resources need to be allocated towards starting this venture. However, there needs to be someone in place to oversee the whole operation. After undertaking the pilot project, it can be agreed upon that the response rate was overwhelming, which showed a great enthusiasm to participate and to receive information.

Furthermore we went on to test for price volatility in the white maize sector in South Africa and determined the impact of information sources like the CEC in trying to reduce volatility, however this source of information was used as substitute mainly because we do not have the proposed crop progress report as yet in South Africa and results show that the impact would be great, and the report would be just as valuable as the USDA counterpart.

7.2 Recommendations

Bearing in mind that DAFF already has infrastructure and the necessary resources to produce crop estimates for the sample size covering 80 % of production areas in South Africa; it is recommended that they take the lead in producing the proposed planting progress report. However, they should get more financial support, as well as help from institutions of higher learning in terms of data analysis. For instance, research institutions could work together with DAFF in endeavouring to produce useful presentations of available data, like info graphics, as created by Argentina. This weekly information could be published on the DAFF website, as well as distributed through mail to other institution like SAGIS for publication on their website. The NWK pilot project has proved that mobile technology is an effective way to communicate with farmers, particularly when limited data is collected and when response and publication time is critical. It is therefore recommended that mobile technology be used to communicate, collect and disseminate the relevant data.

It is accepted, after the experience of the pilot project, that farmers are usually cooperative, when things are explained to them in detail. It is therefore recommended that farmers be educated about the importance of participation in such a venture and allow them to make informed decisions. If they are going to participate, this would be highly beneficial, especially in trying to find volunteers, as is done in Brazil.

In terms of regular review procedures for the proposed planting progress report, the analysis, policy revision and surveying procedures mentioned in chapter 4 from the USDA can be used to make sure that South Africa is on par with the world standard, and that valuable and reliable information is being supplied.

Existing committee structures such as NAMC, CELC, Maize Forum, Maize Trust, need to buy in into the idea in order to make it a success, through their support, funding and current available resources.

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ANNEXURE A: THE WEEKLY CROP PROGRESS SURVEY

The weekly Crop Progress survey asks questions concerning the different stages of growth, condition, and development for various crops across the United States. Each State customises their questionnaires as the crops progress throughout the growing season in each State. The questions asked are based on several factors (HQ required questions, historic tends, and current weather and growth trends) within each State. HQ required questions focus on programme commodities for each State. The following listing contains all of the questions that will be used throughout the growing season across the United States. In the ROCIS submission system we have attached a typical questionnaire that shows that the weekly questionnaire takes approximately 10 minutes to complete.

Table: Crop progress and conditions for grains and oilseeds

CORN
Corn Condition: Acreage Flooded
Corn Condition: Excellent
Corn Condition: Fair
Corn Condition: Frost Damage – Light
Corn Condition: Frost Damage – Moderate
Corn Condition: Frost Damage – None
Corn Condition: Frost Damage – Severe
Corn Condition: Good
Corn Condition: Moisture Content of Grain at Harvest
Corn Condition: Poor
Corn Condition: Very Poor
Corn Harvest Condition: Ear Droppage – Heavy
Corn Harvest Condition: Ear Droppage – Light
Corn Harvest Condition: Ear Droppage – Moderate
Corn Harvest Condition: Ear Droppage – None
Corn Harvest Condition: Lodging – Heavy
Corn Harvest Condition: Lodging – Light
Corn Harvest Condition: Lodging – Moderate
Corn Harvest Condition: Lodging – None
Corn Progress: Acreage that has or will be Replanted
Corn Progress: Dented
Corn Progress: Dough
Corn Progress: Emerged
Corn Progress: Harvested for Grain or Seed
Corn Progress: Harvested for Silage
Corn Progress: Matured
Corn Progress: Milked
Corn Progress: Planted
Corn Progress: Silked

Corn Progress: Tasseled
BARLEY
Barley Condition: Excellent
Barley Condition: Fair
Barley Condition: Good
Barley Condition: Poor
Barley Condition: Very Poor
Barley Progress: Booted
Barley Progress: Emerged
Barley Progress: Harvested
Barley Progress: Headed
Barley Progress: Jointed
Barley Progress: Matured
Barley Progress: Planted
Barley Progress: Turned Color
CANOLA
Canola Condition: Excellent
Canola Condition: Fair
Canola Condition: Frost Damage – Light
Canola Condition: Frost Damage – Moderate
Canola Condition: Frost Damage – None
Canola Condition: Frost Damage – Severe
Canola Condition: Good
Canola Condition: Poor
Canola Condition: Very Poor
Canola Progress: Bloomed
Canola Progress: Harvested
Canola Progress: Planted
Canola Progress: Turned Color
Sweet Corn Condition: Very Poor
Sweet Corn Progress: Harvested
Sweet Corn Progress: Planted
SOYBEAN
Soybean Condition: Excellent
Soybean Condition: Fair
Soybean Condition: Frost Damage – Light
Soybean Condition: Frost Damage – Moderate
Soybean Condition: Frost Damage – None
Soybean Condition: Frost Damage – Severe
Soybean Condition: Good
Soybean Condition: Moisture Content of Soybeans at Harvest
Soybean Condition: Poor
Soybean Condition: Very Poor
Soybean Harvest Condition: Lodging – Heavy
Soybean Harvest Condition: Lodging – Light

Soybean Harvest Condition: Lodging – Moderate
Soybean Harvest Condition: Lodging – None
Soybean Harvest Condition: Shattering – Heavy
Soybean Harvest Condition: Shattering – Light
Soybean Harvest Condition: Shattering – Moderate
Soybean Harvest Condition: Shattering – None
Soybean Progress: Bloomed
Soybean Progress: Emerged
Soybean Progress: Fully Podded
Soybean Progress: Harvested
Soybean Progress: Leaves Dropped
Sunflower Condition: Frost Damage – Light
Sunflower Condition: Frost Damage – Moderate
Sunflower Condition: Frost Damage – None
Sunflower Condition: Frost Damage – Severe
Sunflowers Condition: Excellent
Sunflowers Condition: Fair
Sunflowers Condition: Good
Sunflowers Condition: Poor
Sunflowers Condition: Very Poor
Sunflowers Progress: Bloomed
Sunflowers Progress: Emerged
Sunflowers Progress: Harvested
Sunflowers Progress: Planted
Sunflowers Progress: Ray Flowers Dried or Dropped
SPRING WHEAT
Spring Wheat Condition: Excellent
Spring Wheat Condition: Fair
Spring Wheat Condition: Good
Spring Wheat Condition: Poor
Spring Wheat Condition: Very Poor
Spring Wheat Progress: Booted
Spring Wheat Progress: Emerged
Spring Wheat Progress: Harvested
Spring Wheat Progress: Headed
WINTER WHEAT
Winter Wheat Condition: Excellent
Winter Wheat Condition: Fair
Winter Wheat Condition: Good
Winter Wheat Condition: Poor
Winter Wheat Condition: Very Poor
Winter Wheat Progress: Booted
Winter Wheat Progress: Breaking Dormancy
Winter Wheat Progress: Emerged
Winter Wheat Progress: Grazed
Winter Wheat Progress: Harvested

Winter Wheat Progress: Headed
Winter Wheat Progress: Jointed
Winter Wheat Progress: Matured
Winter Wheat Progress: Pastured
Winter Wheat Progress: Planted
Winter Wheat Progress: Turned Color
GRAIN PROGRESS
Grain Progress: Movement (Farm to Elevator): Heavy
Grain Progress: Movement (Farm to Elevator): Light
Grain Progress: Movement (Farm to Elevator): Moderate
Grain Progress: Movement (Farm to Elevator): None

ANNEXURE B: USDA SURVEY FORM

Project 135

OMB No. 0535-0002: Approval Expires 08/31/2012

USDA

Iowa Crops and Weather

NATIONAL AGRICULTURAL STATISTICS SERVICE

Iowa Field Office
210 Walnut Street Ste 833
Des Moines IA 50309-2195
Phone 515-284-4340 or
1-800-772-0825,
Fax 515-284-4342 or
800-719-1794
nass-ia@nass.usda.gov

Dear Reporter:
Your observations regarding crop progress and soil moisture conditions are important in order to have adequate information for your part of the state. Under Title 7 of the U.S. Code and CIPSEA (Public Law 107-347), data you report are kept **confidential** and used only for statistical purposes in combination with similar reports from other respondents. Response is **voluntary**. Thank you.

REPORT FOR THE WEEK ENDING SUNDAY, AUGUST 5, 2012 – Respond by **9 am** August 6, 2012.

Questions below apply to **your** locality, include **Saturday & Sunday** in your report, adjust your figures if sending early.

If a question does not pertain to your area, enter NA (not applicable); if zero, enter 0 or none.

1. Percent of OAT acreage harvested for grain .... [368] ___ %
2. Percent of CORN acreage silked .... [106] ___ %
3. Percent of CORN acreage in milk stage .... [114] ___ %
4. Percent of CORN acreage in dough stage .... [107] ___ %

5. Percent of CORN acreage dented .... [108] ____%

6. Percent of CORN acreage mature .... [109] ____%

7. Percent of SOYBEAN acreage bloomed .... [136] ____%

8. Percent of SOYBEAN acreage pods set .... [137] ____%

9. Percent of ALFALFA third cutting .... [429] ____%

10. Number of days suitable for fieldwork .... [010] ____

11......... Topsoil moisture supply (enter percent of each type so that sum = 100%)

VERY SHORT	SHORT	ADEQUATE	SURPLUS	TOTAL
[11] ____ %	[12] %	[13] %	[14] %	100 %

12......... Subsoil moisture supply (enter percent of each type so that sum = 100%)

VERY SHORT	SHORT	ADEQUATE	SURPLUS	TOTAL
[21] ____ %	[22] %	[23] %	[24] %	100 %

13. CROP CONDITION (enter percent of each type so that sum = 100%)

CROP	VERY POOR	POOR	FAIR	GOOD	EXCELLENT	TOTAL
Corn Condition	[100] _____ %	[101] _____ %	[102] __ %	[103] __ %	[104] %	100 %
Soybean Condition	[130] _____ %	[131] _____ %	[132] __ %	[133] __ %	[134] %	100 %

Source: USDA, 2014

ANNEXURE C: USDA MONTHLY CROP WEATHER REPORT

Project 135 QID 0298944 | OMB No. 0535-0002: Approval Expires 06/30/2012

USDA

MONTHLY CROP-WEATHER REPORT

NATIONAL AGRICULTURAL STATISTICS SERVICE

West Virginia Field Office
1900 Kanawha Blvd.
Charleston, WV 25305
Phone 1-800-535-7088, Fax 1-304-558-0297
nass-wv@nass.usda.gov

Under Title 7 of the U.S. Code and CIPSEA (Public Law 107-347), data you report are kept **confidential** and used only for statistical purposes in combination with similar reports from other respondents. Response is **voluntary**. We appreciate your assistance.

COMPLETE FOR WEEK ENDING SUNDAY, JANUARY 29, 2012. INSTRUCTIONS: Please answer the questions relating to crops grown in your county or counties through the current week ending date. Enter the percent of crop and livestock in each condition ranging from very poor to excellent (the total must equal 100). **Please submit from the CPCS Website (http://cpcsweb.nass.usda.gov), or fax by 9:30 AM Monday.** Any questions or problems, contact Lacey Radabaugh, USDA/NASS, West Virginia Field Office, at 1-800-535-7088.

SUPPLIES	(Enter percent of each type so that the sum = 100%)							
	VERY SHORT		SHORT		ADEQUATE		SURPLUS	
TOPSOIL MOISTURE	011		012		013		014	
HAY & ROUGHAGE	660		661		662		663	
FEED GRAIN	690		691		692		693	

CROP & LIVESTOCK CONDITION (Enter percent of each type so that the sum = 100%)										
COMMODITY	VERY POOR		POOR		FAIR		GOOD		EXCEL	
Wheat	250		251		252		253		254	
Cattle/Calves	600		601		602		603		604	
Sheep/Lambs	630		631		632		633		634	
Range & Pasture	300		301		302		303		304	

COMMENTS: (Main farm activities, weather conditions, possible weather damage to fruit crop, insect and disease problems, etc.)
Please make comments for entire month of January, i.e., feeding of livestock is more (less) than normal.

REPORTED BY: ______________________ COUNTY(IES):______________________ DATE: __________

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB number is 0535-0002. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Source: USDA, 2014

ANNEXURE D: CEC REPORTING DATES 2015

SAGIS PUBLICATION DATES

	2015											
Monthly Info:	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
SAGIS Monthly Data	26	24	24	28	25	26	24	25	28	26	24	22
SAGIS Monthly Product Data	-	-	-	-	-	-	-	-	4	2	6	4
Crop Estimates Committee	27	13 & 26	25	29	7 & 26	30	28	26	29	27	25	15
Supply & Demand Estimates Committee	13 & 13	03-Mar	27	05-May	29	03-Jul	31	28	05-Oct	30	27	11-Jan
Weekly Info:												
SAGIS Weekly Bulletin				2			2			1		3
	8	5	5	9	7	4	9	6	3	8	5	10
	15	12	12	16	14	11	16	13	10	15	12	~~17~~
	22	19	19	23	21	18	23	20	17	22	19	~~24~~
	29	26	26	30	28	25	~~30~~	27	25	29	26	~~31~~
SAGIS Weekly Imports and Exports Data			3			2			1			1
	7	3	10	8	5	9	7	4	8	6	3	8
	13	10	17	14	12	17	14	12	15	13	10	~~15~~
	20	17	24	21	19	23	21	18	22	20	17	~~22~~
	27	24	31	29	26	30	28	25	29	27	24	~~29~~
SAGIS Weekly Producer Deliveries Data				1			1		2			2
	8	4	4	9	6	3	8	5	9	7	4	9
	14	11	11	15	13	10	15	13	16	14	11	~~17~~
	21	18	18	22	20	18	22	19	23	21	18	~~23~~
	28	25	25	30	27	24	29	26	30	28	25	~~30~~

Notes:

All publications are released after 12:00 on the scheduled date

X = There wil be no publication that week

Source: *SAGIS*, 2015

ANNEXURE E: RESULTS FROM CHAPTER 4 LEHECKA STUDY

Table 1. Weekday Statistics for Corn and Soybean Close-to-Open Returns, April to November, 1986 – 2012

	Corn		Soybeans	
	Non-weekend	Weekend	Non-weekend	Weekend
Mean	0.00	-0.12**	0.01	-0.10**
Median	0.00	-0.13	-0.02	-0.10
Variance	0.38	1.24	0.30	1.13
F-test	3.29**		3.77**	
Data points	3631	941	3429	881

Note: Returns (r) are computed as the difference in the natural logarithm of price multiplied by 100. New-crop futures contracts (December corn and November soybeans) are used. Single (*) and double (**) asterisks denote significance at the 5% and 1% levels, respectively.

Source: Lehecka, 2013

Table 2. Summary Statistics for Corn and Soybean Non-Weekend Close-to-Open Returns, April to November, 1986 – 2012

	Corn		Soybeans	
	r	$\|r\|$	r	$\|r\|$
Mean	0.00	0.35**	0.01	0.29**
Median	0.00	0.20	0.00	0.16
Variance	0.37	0.25	0.28	0.20
Skewness	1.11**	3.91**	1.09**	4.95**
Kurtosis	14.67**	22.14**	24.25**	36.62**
Jarque-Bera	42986**	107722**	108830**	264275**

Source: Lehecka, 2013

Table 3. Futures Return Volatility Test Results for Crop Progress Reports for Corn and Soybeans, Non-Weekend Close-to-Open Returns, April to November, 1986–2012

	Corn						Soybeans					
Reports	*N*	Report Day Variance	Pre-/ Postreport Day Variance	Diff. in Report and Pre-/ Postreport Variance	*F*-Stat.	Kruskal-Wallis χ^2-Stat.	*N*	Report Day Variance	Pre-/ Postreport Day Variance	Diff. in Report and Pre-/ Postreport Variance	*F*-Stat.	Kruskal-Wallis χ^2-Stat.
All	940	0.51	0.34	0.17	1.49**	22.96**	890	0.36	0.26	0.10	1.37**	16.60**
Condition & Progress	554	0.67	0.40	0.26	1.66**	22.32**	486	0.53	0.33	0.19	1.58**	32.66**
Progress	386	0.27	0.25	0.03	1.12	3.13	404	0.16	0.17	-0.01	0.95	0.10
April	114	0.22	0.18	0.04	1.23	7.19*	114	0.07	0.05	0.02	1.35*	0.68
May	116	0.49	0.30	0.19	1.64**	13.78**	116	0.25	0.18	0.07	1.40*	0.37
June	120	0.63	0.52	0.10	1.20	3.08	120	0.28	0.47	-0.20	0.58**	0.80
July	119	1.35	0.67	0.68	2.02**	15.68**	119	1.16	0.57	0.58	2.02**	14.06**
August	120	0.81	0.33	0.48	2.47**	10.67**	120	0.61	0.26	0.35	2.36**	21.45**
September	115	0.18	0.20	-0.03	0.87	0.88	115	0.16	0.12	0.03	1.27	8.16**
October	120	0.20	0.22	-0.03	0.89	2.55	120	0.10	0.13	-0.04	0.72*	1.38
November	116	0.09	0.29	-0.20	0.32**	1.28	66	0.12	0.33	-0.21	0.37**	0.02

Note: Returns are computed as the difference in the natural logarithm of price multiplied by 100. *N* denotes the number of reports included in the sample. New-crop futures contracts (December corn and November soybeans) are used. Single (*) and double (**) asterisks denote significance at the 5% and 1% levels, respectively.

Source: Lehecka, 2013

Table 4. Futures Return Volatility Test Results for Crop Progress Reports for Corn and Soybeans, Non-Weekend Close-to-Open Returns, April to November, 1986–1989, 1990–1995, 1996–2001, 2002–2012

	Corn						Soybeans					
Reports	N	Report Day Variance	Pre-/Postreport Day Variance	Diff. in Report and Pre-/Postreport Variance	F-Stat.	Kruskal-Wallis χ^2-Stat.	N	Report Day Variance	Pre-/Postreport Day Variance	Diff. in Report and Pre-/Postreport Variance	F-Stat.	Kruskal-Wallis χ^2-Stat.
						1986–1989						
All	139	1.19	0.84	0.35	1.41*	0.02	133	0.87	0.79	0.08	1.10	0.24
Condition & Progress	74	1.85	1.14	0.71	1.62*	0.21	65	1.41	1.19	0.22	1.18	0.13
Progress	65	0.45	0.42	0.03	1.06	0.31	68	0.36	0.36	-0.00	0.99	0.07
						1990–1995						
All	209	0.52	0.49	0.03	1.06	1.07	200	0.59	0.48	0.10	1.21	0.56
Condition & Progress	120	0.59	0.56	0.03	1.05	0.09	105	0.86	0.56	0.29	1.52**	0.00
Progress	89	0.42	0.40	0.02	1.05	2.21	95	0.29	0.37	-0.08	0.79	0.58
						1996–2001						
All	209	0.58	0.29	0.29	1.97**	5.28*	199	0.22	0.06	0.17	3.83**	17.34**
Condition & Progress	117	0.82	0.33	0.49	2.51**	9.26**	106	0.37	0.08	0.29	4.62**	34.64**
Progress	92	0.20	0.25	-0.04	0.82	0.01	93	0.05	0.03	0.01	1.40*	0.25
						2002–2012						
All	383	0.21	0.10	0.11	2.10**	46.75**	358	0.12	0.06	0.07	2.17**	18.35**
Condition & Progress	243	0.26	0.13	0.13	2.05**	32.23**	210	0.17	0.07	0.10	2.55 **	26.70**
Progress	140	0.13	0.06	0.07	2.34**	14.29**	148	0.06	0.04	0.02	1.42*	0.25

Note: Returns are computed as the difference in the natural logarithm of price multiplied by 100. N denotes the number of reports included in the sample. New-crop futures contracts (December corn and November soybeans) are used. Single (*) and double (**) asterisks denote significance at the 5% and 1% levels, respectively.

Source: Lehecka, 2013

Table 5. Futures Price Impacts to Crop Condition Price Signals for Corn and Soybeans, Non-Weekend Postreport Returns, April to November, 1986–2012

	Bullish Price Signal			Bearish Price Signal			Neutral Price Signal		
	Mean	T-Stat.	Wilcoxon W-Stat.	Mean	T-Stat.	Wilcoxon W-Stat.	Mean	T-Stat.	Wilcoxon W-Stat.
				Corn returns					
N		206			201			120	
close-to-open $t = 0$	0.30	4.71**	12064**	-0.13	-2.15*	5842**	0.01	0.27	2404
open-to-close $t = 0$	-0.03	-0.31	9005	-0.06	-0.59	8433	-0.10	-0.60	3109
close-to-close $t = 1$	0.18	1.60	11234	-0.13	-1.11	8752	0.17	0.95	3554
close-to-close $t = 2$	-0.22	-1.74	6243	-0.12	-0.94	6370	0.05	0.27	2680
				Soybeans returns					
N		204			160			95	
close-to-open $t = 0$	0.17	2.97**	12237**	-0.12	-1.99*	3682**	0.06	1.15	2294
open-to-close $t = 0$	-0.18	-1.61	9754	0.06	0.65	6343	-0.24	-1.57	1876
close-to-close $t = 1$	0.10	0.98	11202	-0.00	-0.04	6295	0.08	0.45	2435
close-to-close $t = 2$	-0.18	-1.58	6854	0.15	1.29	5093	-0.15	-0.76	1605

Note: Returns are computed as the difference in the natural logarithm of price multiplied by 100. N denotes the number of reports included in the sample. New-crop futures contracts (December corn and November soybeans) are used. Single (*) and double (**) asterisks denote significance at the 5% and 1% levels, respectively.

Source: Lehecka, 2013

Table 6. Regression Estimates of Futures Price Impacts to Crop Condition Changes for Corn and Soybeans, Non-Weekend Postreport Returns, April to November, 1986–1989, 1990–1995, 1996–2001, 2002–2012

close-to-open $t=0$		open-to-close $t=0$		close-to-close $t=1$		close-to-close $t=2$	
$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_0$	$\hat{\beta}_1$	$\hat{\beta}_0$	$\hat{\beta}_1$
Corn, 1986–2012							
0.05	-3.89**	-0.06	0.48	0.05	-1.81	-0.13	-1.21
(0.03)	(0.54)	(0.07)	(1.09)	(0.07)	(1.16)	(0.08)	(1.21)
Corn, 1986–1989							
0.03	-3.27*	-0.06	0.57	0.03	-0.68	0.01	-4.58**
(0.16)	(1.38)	(0.16)	(1.33)	(0.20)	(1.70)	(0.20)	(1.65)
Corn, 1990–1995							
0.06	-2.04	0.02	-0.22	-0.17	-2.34	-0.13	-0.55
(0.07)	(1.09)	(0.07)	(1.13)	(0.12)	(1.83)	(0.11)	(1.65)
Corn, 1996–2001							
0.19*	-10.15**	-0.02	-0.20	-0.15	-5.70	-0.09	4.75
(0.08)	(2.00)	(0.13)	(3.39)	(0.13)	(3.37)	(0.15)	(3.74)
Corn, 2002–2012							
-0.04	-4.90**	-0.11	1.05	0.25	-1.59	-0.16	3.13
(0.03)	(0.63)	(0.14)	(2.83)	(0.13)	(2.78)	(0.14)	(3.03)
Soybeans, 1986–2012							
0.02	-2.84**	-0.09	1.79	0.05	-1.41	-0.06	0.25
(0.03)	(0.60)	(0.07)	(1.22)	(0.07)	(1.25)	(0.08)	(1.38)
Soybeans, 1986–1989							
0.03	-2.54	-0.10	0.34	-0.01	-0.08	0.02	-2.38
(0.15)	(1.57)	(0.16)	(1.61)	(0.21)	(2.15)	(0.21)	(2.03)
Soybeans, 1990–1995							
0.04	0.07	0.02	-0.28	-0.16	-0.41	-0.09	-2.44
(0.10)	(1.52)	(0.07)	(1.15)	(0.13)	(2.05)	(0.13)	(2.11)
Soybeans, 1996–2001							
0.06	-7.45**	0.00	-0.94	0.01	-4.10	-0.12	7.21
(0.06)	(1.46)	(0.15)	(3.87)	(0.14)	(3.69)	(0.17)	(4.32)
Soybeans, 2002–2012							
-0.05	-5.13**	-0.14	8.25*	0.16	-3.36	0.04	6.10
(0.03)	(0.68)	(0.13)	(3.19)	(0.12)	(2.93)	(0.13)	(3.33)

Note: Coefficient estimates are multiplied by 100. Standard errors are reported in parentheses. Regressions are checked for heteroskedasticity, and no corrections are considered necessary. New-crop futures contracts (December corn and November soybeans) are used. Single (*) and double (**) asterisks denote significance at the 5% and 1% levels, respectively.

Source: Lehecka, 2013