Sheep Enterprise Budgets
-Beneficial planning tools within Agriwise Macedonia

Jasmina Milevska

Sheep Enterprise Budgets
- Beneficial planning tools within Agriwise Macedonia

Jasmina Milevska

Acknowledgements

It's been a worthwhile experience to study abroad in such a multicultural environment and expand my knowledge as a master student in agricultural economics and management at the Swedish University of Agricultural Sciences (SLU).
At the same time it was a huge pleasure and satisfaction to be one of the persons involved in the project ***"Building Capacity for Macedonian Higher Education, Research and Policy Analysis in Agriculture - with a focus on Agricultural Economics"***.

The above mentioned wouldn't be possible without the help and support of a particular people and entities responsible for the successful realization of the project, so I would like to put into words my sincere gratitude to them: the Institute of Agricultural Economics from Faculty of Agricultural Sciences and Food in Skopje for their constant belief and considering me as an ambitious and competent person for the contribution in the project. This project wouldn't be attainable without cooperation from the Department of Economics within the Swedish University of Agricultural Sciences (SLU), as well as the financial support from the Swedish International Development Agency (SIDA). Therefore, I would like to show huge gratitude to the people employed in these institutions that were helping me during my entire period of master studies and made my stay in Sweden more pleasant.

I have to express my sincere gratefulness to all professors from to the Department of Economics at SLU for opening new horizons of knowledge for me and with that making the studies more challenging.

It was a great honor working with them, and I am extremely indebted to my supervisors Bo Öhlmer and Aleksandra Martinovska-Stojčeska for their wisdom, knowledge and devotion which motivate and highlighted me on the way to achieve my accomplishments. Thank you for the encouragement, guidance and stimulating suggestions, which were crucial for the successfulness of writing my thesis.
I am also thankful to my fellow students, professors and colleagues from the both departments, who were always helpful and supported me all along.

A kindly-special thank to Prof. Vladimir Dzabirski and MSc Kocho Porchu for their great help and being always opened for a sincere cooperation.

Also I would like to thank Petar Trajkovski from the National Extension Agency (NEA) in Bitola, for helping me with his consultations, knowledge and practical experience in sheep production as well as providing me with the useful farm data collection.

Last but not least, I'm deeply thankful to my parents Ivanco and Slavica, my sister and lovely nieces, as well as my whole closest (big) circle of family for making a good working atmosphere for me and keep on bringing happiness to my everyday life, giving me power, energy, love and full support for achieving my future aspires.

Have to say big thanks for all the support, help and positive energy I had during the whole studies from 'my family' in Uppsala - Tuna family.

I'm especially thankful to my beloved fiancé Slobodan for the encouragement, tolerance, support and patience he had for me in doing this.

Without them all this would be worth nothing.

Thank you all for believing in me ☺
Once again I express enormous appreciation to you all.

Summary

Generally in Macedonia keeping farm records and farm business planning is not often practiced like an ordinary activity in farming. Therefore one of the crucial things to do it is to comprise and continuously practice record keeping of farm data. The efficient and justified farm business planning should be based on farm records about the previous work of the farm, which will bring a structured approach for planning all the activities, as well as provide a good basis for attracting investors and creditors for the additional expansion of the business.

Given that sheep breeding holds an important part of the livestock production in Macedonia, there is a need for adding analytical sheep enterprise budgets to support the farm business planning process at sheep farms. The aim of this research was to develop sheep enterprise budgets created on the best production practice for Macedonian conditions of breeding and test their applicability into the farm business plan model Agriwise Macedonia.

The sheep budgets were composed with a process of data collecting consisted of direct farm data (for the cases), expert's consultation and relevant desk research, as well as a literature study. The aim of doing it was to attain more accurate calculations of the enterprise budgets, which will result in a more precise outcome in the farm business plan model Agriwise Macedonia. For the fulfilment of the aim of the study two types of sheep enterprise budgets were composed. One type of budgets is with the accelerating lambing system (potential) and another with the current (traditional) technology of production. The main users of the sheep enterprise budgets and the farm business planning model Agriwise Macedonia will be advisors, providing it for farmers. The budgets integrated in the Agriwise Macedonia model can be used in the teaching process as well.

From the composed sheep enterprise budgets with 2009 price level it can be concluded that the traditional-cheese enterprise budget was the most profitable with 8937 MKD total income (including subsidies) per ewe and after covering 6526 MKD for direct-separate costs 1, the obtained gross margin1 is 2411 MKD per ewe. The main reason for this outcome is the high market price of the cheese. The income from white sheep cheese is 3483 MKD per ewe, or represents 44% of the total incomes.

From the obtained results with the Agriwise Macedonia model can be concluded/suggested that for the family farms with a herd size between 200-500 ewes for production like most profitable is the traditional system with production of traditional white sheep cheese. These results can be even better with improvement of the conditions for cheese preparation and taking some initiatives for making a brand of traditional Macedonian white cheese. As a result it can be exported out of the country with a higher than the present price which means it will accumulate more profit.
The traditional way of breeding with selling the milk as raw without processing it is not that profitable and that does not depend on the size of the flock.

The accelerating lambing system with production of three lambs in 2 years from the obtained results can be recommended for a herd size above 500 ewes for production. The reason is more efficient use of the available resources, as it was tested in the case study with the agricultural company. And also confirmed with the family farm where with 260 ewes in total, it was more profitable to use only the traditional-cheese system of production With support of constant farm record keeping and the farm business model Agriwise Macedonia, these sheep budgets can be of great value for the strategic and operational planning in sheep farms in Macedonia, as well as an investment document in applying for credit or grant. That will contribute for justified future decisions in achievement of more profitable results, which will lead/contribute to a modern and competitive farm management tool in the Macedonian agriculture.

Key terms: farm management planning tool, farm records, business planning, sheep enterprise budgets, Agriwise Macedonia.

Sammanfattning

Varken bokföring eller verksamhetsplanering är vanligt i det Makedonska jordbruket. Lantbrukarnas planering bör baseras på data om tidigare verksamhet och resultat, men man har alltså ett dåligt underlag. Det är därför viktigt att ta fram informationsunderlag och en strukturerad metod för planering av framtida verksamhet, eventuella investeringar och annan företagsutveckling.

Fårskötsel är en viktig del av det Makedonska jordbruket, och där saknas sådant informationsunderlag. Det finns ett behov av att ta fram analytiska produktionsgrenskalkyler för fårskötsel och på så sätt stödja fårproducenternas planering. Syftet med uppsatsen är att utveckla sådana kalkyler inriktade på bästa produktionsteknik för Makedonska förhållanden, och testa hur de går att tillämpa i planering med "Agriwise Macedonia", som är ett system för planering av lantbruksföretag .

Data har samlats in direkt från lantbruksföretag, från experter på fårskötsel och från skriftligt material. Dessutom har en litteraturstudie gjorts. Syftet med datainsamlingen var att få en mer noggrann beräkning av ett företags produktionsgrenskalkyler vilket förväntas leda fram till en mer noggrann affärsplan enligt Agriwise modellen. Två typer av produktionsgrenskalkyler med olika produktionsteknik har tagits fram. Den ena kalkylen baseras på systemet med accelererad lamning och den andra på traditionell produktionsteknik. De huvudsakliga användarna av kalkylerna för fårskötsel och systemet "Agriwise Macedonia" blir rådgivarna, som i sin tur förmedlar informationen till lantbrukarna. Kalkylerna kommer också att användas i undervisning tillsammans med Agriwise Macedonia modellen.

Slutsatserna från produktionsgrenskalkylerna, med 2009 prisnivå, är att den traditionella produktionstekniken och ostproduktion var mest lönsamt med totala intäkter motsvarande 8937 MKD (inklusive bidrag) per tacka, och efter täckning av 6526 MKD för direkta-separata kostnader 1 blir täckningsbidraget 2411 MKD per tacka (se tilläggen 1-3). Den främsta orsaken till detta är det höga marknadspriset på ost. Intäkterna från den vita fårosten är 3483 MKD per tacka, eller 44 % av de totala inkomsterna.

Affärsplanerna beräknade med "Agriwise Macedonia" modellen för fallgårdarna visar att det för ett familjejordbruk med en besättning på mellan 200-500 tackor är det traditionella systemet med produktion av vit fårost mest lönsamt. Ett sätt att förbättra lönsamheten ytterligare kan vara att skapa ett varumärke för denna ost och sälja på export till högre pris. Den traditionella inriktningen mot att sälja mjölken som obearbetad råvara är inte lika lönsam. Lönsamheten i det traditionella familjeföretaget påverkas inte av besättningsstorleken. Systemet med accelererad lamning med tre lamningar på två år är lönsammare än övriga system vid besättningsstorlek över 500 tackor enligt fallstudien, vilket beror på effektivare användning av gårdens resurser.

De framtagna fårkalkylerna kan vara av stort värde för planeringen vid Makedonska fårgårdar, särskilt om de justeras till resp. gårds förutsättningar och används tillsammans med planeringsmodellen "Agriwise Macedonia". Sådana planer är också värdefulla vid ansökan om kredit eller bidrag. Arbetet kan således bidra till ett modernt och konkurrenskraftigt verktyg för utveckling av det Makedonska jordbruket.

Резиме

Водењето на евиденција на фарма и деловно планирање не се практикуваат како редовни активности на земјоделските стопанства во Република Македонија. Затоа, основен чекор кој треба да се воведе и практикува редовно е континуирано водење на евиденција за работењето на фармата. Ефикасно и издржано деловно планирање се базира врз податоци за претходната работа на фарма, што придонесува кон структуриран приод за планирање на сите активностии и како добра основа за привлекување на инвеститори и кредитори за дополнително проширување на бизнисот.

Имајќи го предвид фактот дека овчарството претставува значаен потсектор во земјоделството во Македонија, постои потреба за изработка на аналитички калкулации за овчарско производство како поддршка на стопанствата во деловниот процес на планирање во овчарските фарми.

Целта на ова истражување беше да се развијат аналитички калкулации создадени врз основа на добра производствена пракса за македонски услови на одгледување на овци и да се тестира нивната применливост во деловниот модел за деловно планирање Agriwise Македонија.

Аналитичките какклулации беа составени преку процес на собирање на директни податоци од фарма (за студии на случај), консултации со експерти во овој потсектор и консултација на релевантни публикации и литература. Целта на тоа е да се постигнат попрецизни пресметки и да се добие попрецизен резултат во деловниот модел за деловно планирање Agriwise Македонија. Два типа на аналитички калкулации беа составени за да се исполни целта на студијата: калкулации за систем на забрзано јагнење (потенцијален) и какклулации на моментната (традиционална) технологија на производство. Главните корисници на овие калкулации како и деловниот модел Agriwise Македонија ќе бидат советниците во земјоделскиот сектор и преку нив фармерите. Овие калкулации, како интегрален дел на моделот Agriwise Македонија, може да се користат и во наставниот процес.

Од изработените аналитички калкулации за овци со ниво на цените од 2009 година може да се заклучи дека традиционалниот начин на одгледување со производство на сирење е најпрофитабилен со 8937 денари вкупен приход (вклучувајќи и субвенции) по овца и по покривање 6526 денари за директени-одделни трошоци 1, добиената контрибуциона (бруто) маржа1 е 2411 денари за овца. Главната причина за ваквиот резултат е високата пазарна цена на овчо сирење. Приходите од бело овчо сирење се 3483 денари за овца, односно застапени се со 44% во вкупните приходи.

Од добиените резултати со моделот Agriwise Македонија може да се заклучи /сугерира дека за семејни фарми со големина на стадо помеѓу 200-500 овци за производство традиционалниот систем на одгледување со производство на традиционално бело овчо сирење е попрофитабилен. Добиените резултати може да бидат дури и повисоки со подобрување на условите за подготовка на сирење и преземање на некои иницијативи за изработка на традиционален бренд на македонско бело сирење. Како резултат на тоа, сирењето може да се извезува со повисока цена од сегашната што значи дека ќе се акумулира повисока добивка.

Традиционалниот начин на одгледување со продажба на сурово овчо млеко без преработка, дава најниска профитабилност и не зависи од големината на стадото.

Системот на забрзано јагнење со производство на три јагниња во две години, од добиените резултати може да се препорача за стадо со големина над 500 овци за производство. Причината за тоа е поефикасно искористување на располoжливите ресурси, како што беше тестирано во студија на случај со земјоделската фирма. Исто така тоа се потврдува и со семејна фарма, каде што со вкупно 260 овци за производство, како попрофитабилен систем на производство е традиционалниот со преработка на млекото во бело овчо сирење.

Со поддршка на постојана евиденција на фарма и деловниот модел Agriwise Македонија, овие калкулации може да бидат од голема вредност за стратегиско и оперативно деловно планирање на овчарските фарми во Македонија, како и при аплицирање за кредит. Тоа ќе придонесе за издржани идни одлуки во постигнувањето на попрофитабилни резултати во овчарството, што ќе доведе / придонесе кон модерна и конкурентна менаџмент/алатка во македонското земјоделство.

Клучни зборови: менаџмент-алатка за планирање во земјоделството, водење евиденција, деловно планирање, аналитички калкулации за овци, Agriwise Македонија.

Abbreviations

CGM - Capital Gain Margin
CR - County Report
CTR - Capital Turnover Rate
Denar - Macedonian currency
GDP - Gross Domestic Product
GM - Gross Margin
IRR - Internal Rate of Return
MAFWE - Ministry of Agriculture, Forestry and Water Economy
MKD - Macedonian denar
NEA - National Extension Agency
NPARD - National Programme for Rural and Agricultural Development
NPV - Net Present Value
SS - Sector study
SSO - State Statistical Office
SY - Statistical Yearbook

Currency conversion rate:
1 EUR = 61 MKD

Table of Contents

List of Tables

List of Figures

1 Introduction

"Good management is a crucial factor in the success of any business. Farms are no exception. To be successful, farm managers need to spend more time making management decisions and developing management skills than their parents and grandparents did"(Kay R.D et al. 2008, 3).

1.1 Problem background

Macedonia is a landlocked country in the central Balkan Peninsula in Southeastern Europe covering an area of 25,713 km^2 and a population of around 2 million people (SS, 2009). It is characterized with diverse natural conditions and has a transitional climate from Mediterranean to continental. There are three main climatic zones in the country: temperate Mediterranean, mountainous and mildly Continental, which give good conditions for agricultural development.

After gaining its independence from Former Yugoslavia in 1991, Republic of Macedonia has gone through transition from planned to market economy and is in a process of economic development.
The agricultural sector with its growth potential and perspective has always had an important part in the Macedonian economy and is still playing crucial role in the contribution to the national economy with a gross domestic product (GDP) of around 9,4% in 2007(ARARD, 2009) comparing the 1.6% to EU-25(NPARD 2007-2013).

Agricultural land in the Republic of Macedonia amounts to around 1 million ha (almost half of the whole territory), nearly 50% of it is arable land and the rest is mostly permanent grazing land. In 2008 from total agricultural area of 1 064 000 hectares, 542 000 hectares are covered by pastures with 738kilograms/yield per ha (SY 2009). About 80% of the agricultural land is owned or leased by around 180 000 family farms, with an average size of nearly 2 ha fragmented into parcels of 0,3-0,5ha (NPARD 2007-2013).

The livestock production is of great importance for the national agriculture in Republic of Macedonia and according to the Breeding strategy, the development of livestock production should be based on genetically superior animals that can increase profitability of the farmers (CR, 2003).
 "The livestock sector in Macedonia is characterized by a large number of very small, subsistence-oriented farm households, a limited but growing number of small, commercially-oriented family farming businesses and a decreasing number of large, specialised livestock enterprises, the former State Owned Agricultural Enterprise. Individual farms own 67% - 100% of the major livestock species. All production systems are constrained by limited access to credit, a weak genetic and research base, inadequate market and technical information networks and the lack of an effective policy framework for the industry. These constraints are central to the current low profitability of most livestock production. Family farms are further constrained by their limited access to land, particularly state-owned agricultural land, and the ineffectiveness of smallholder farming lobby groups" (ibid).

Macedonia is a net importer of agricultural and food products. Main export products are tobacco, wine and lamb.

In 2008 the total number of sheep was 816 604, and 587 625 were ewes (SY, 2009).

According to the economic importance of its products (milk, meet, fertilizers and wool) sheep breeding in Macedonia is on the second position in the livestock production. In the last 15

years sheep production accounts for around 13% of the total value of agricultural and livestock production (SS, 2009). The basic breeding orientations are milk and meat production.

Around 96% of the total number of sheep is raised in the individual sector and almost 4% by the agricultural enterprises and cooperatives. Like a consequence of the reduction of fodder base, low prices of meat, milk and wool and high prices of fodder and bulky food, the total number of raised sheep in the last 15 years shows a downtrend with a decrease of approximately 65% from year 1995 (SS, 2009).

Average production of Macedonian sheep milk (which is mainly used for production of traditional sheep cheese) in the period 1995-2007, accounts for 19% of total milk production (SS, 2009). The production of sheep meat (half or more of the total sheep meet is lamb and almost all goes for export) for the same period represents about 10 % of total livestock output (ibid). Both commodities (sheep milk and meat) for the given period accounts for around 5% of the total value of livestock production (SS, 2009).

The agricultural sector in Macedonia in the process of transition went through most changes and is facing with many difficulties to adjust to the new production and the newly set market conditions.

Because Macedonia is eager to start the accession process into the structures of EU, Macedonian agriculture has to get closer to the European standards of agricultural production. Among the many improvements which need to be done in order to have a modern and competitive agriculture incorporated into the big EU 'family', there is the necessity of implementing and development of consistent farm management techniques. One of the crucial things to do it is to include and continuously practice record keeping of farm data.

According to Turner and Taylor (1998) record keeping is often seen as a necessary evil by farmers.
Besides that, for the farmer's successful performance in all their activities, there is a need of preparing a farm business plan.
The efficient and justified farm business planning should be based on farm records about the previous work of the farm.
According to Olson (2004) in an uncertain environment of operating, a farm business needs a structured approach for planning all the activities. This approach can be reached with a written business plan.
"Making business plan not only forces a manager to make and defense choices, but also provides a document to show to creditors, investors, and customers"(Olson, 2004, 16).

1.2 Problem formulation

In Macedonia farm business planning it's rarely practiced like an ordinary activity in farming. Private family farms are not obliged to keep farm records or compose a farm accounting system. Consequently very often they are facing with a problem of lack of information for evaluating the success of the farm and profitability of their production; as well as sustain the process of decision making and farm business planning (Martinovska-Stojceska et al., 2010).

According to Turner and Taylor (1998) there are two main reasons for keeping records and accounts: mandatory (legal requirements) and management objectives (analysis and planning). Good records are vital part for a successful farming and they have to be simple and accurate, so the both sides (users and persons doing the recording) can benefit from it.

The farmer as a manager performs the basic management functions as planning, organising, coordinating and controlling. He /She have to synchronize the strategic and operating plans for the continuous control and coordination of the costs. This will be done much more easily and precise when all the available resources on farm are used for fulfilling the farmer's objectives. It will also lead to a further expand of the farm business. In order to accomplish this, making a written farm business plan will bring a structured approach for planning all the activities, as well as provide a good basis for attracting investors and creditors for the additional expand of business (Kay R.D.et al., 2008).

The department of Economics on the Swedish Agricultural University (SLU) had developed a model for support of the process of business planning on farm. The model itself is consisted of analytical income and costs budgets for the most prevalent livestock and vegetable enterprises, as well as database for support of business planning on farm. Because of the need for this kind of tool in the agriculture in Macedonia, this model was adjusted to the Macedonian conditions.

Given that sheep breeding holds an important part of the livestock production in Macedonia, there is a need for adding analytical sheep enterprise budgets to support the farm business planning process at sheep farms.

1.3 Aim

The aim of this research is to develop sheep enterprise budgets created on the best production traits for Macedonian conditions of breeding and integrate them into the farm business plan model Agriwise Macedonia.

The budgets in farm business planning context can improve the overall strategic and operating planning on farm and support a justified decision in approaching more profitable results. Also, the aim is to provide a good basis for additional expansion of the business.

The broad aim of the research:

- Compose sheep enterprise budgets with the traditional technology (current) of production(traditional milk and traditional cheese);
- Compose sheep enterprise budgets with the accelerating lambing system – the planned (potential) technology of production;
- Analyze the average profitability with current technology and the technology of planned (potential) accelerating lambing system of production;
- Conclude about the applicability of the developed enterprise budgets in the Agriwise Macedonia model.

These technologies of production are chosen because they are used (current) and applicable (potential) in Macedonian conditions for breeding sheep.

Such a sheep farm business planning tool, using the Agriwise support, would make a basis for a strategic and/or operational business plan which can be used first of all as a basis for evaluation of the current economic condition of the given business, and as an investment document in applying for credit or grant.
The enterprise budgets and the farm business planning model will mainly be provided to the farmers through the advisors. The advisors will be the main users.

Last but not least, the budgets integrated in the Agriwise Macedonia model can also be used in the teaching process.

1.4 Outline

The outline of the thesis, illustrated in Figure 1, is intended to give the reader a picture of the structure of the study.
Chapter 1 will give the reader a short introduction of the problem background and formulation as well as the aim of the study. In the following *chapter 2* is presented the method-approach used to fulfil the aim of the study. *Chapter 3* is devoted to the theoretical perspectives which suppose to give a broad understanding about the problem addressed in the study. In *chapter 4* is the background for the empirical study, the basis for the forthcoming *chapters 5* with the empirics and *6* where altogether being analysed and discussed. Subsequent to that in *chapter 7* conclusions are drawn in regard to fulfill the aim.

1. Introduction

⇩

2. Method

⇩

3. A theoretical perspective

⇩

4. Background for the empirical study

⇩

5. Empirical study

⇩

6. Analysis –Applicability of the enterprise budgets

⇩

7. Conclusions
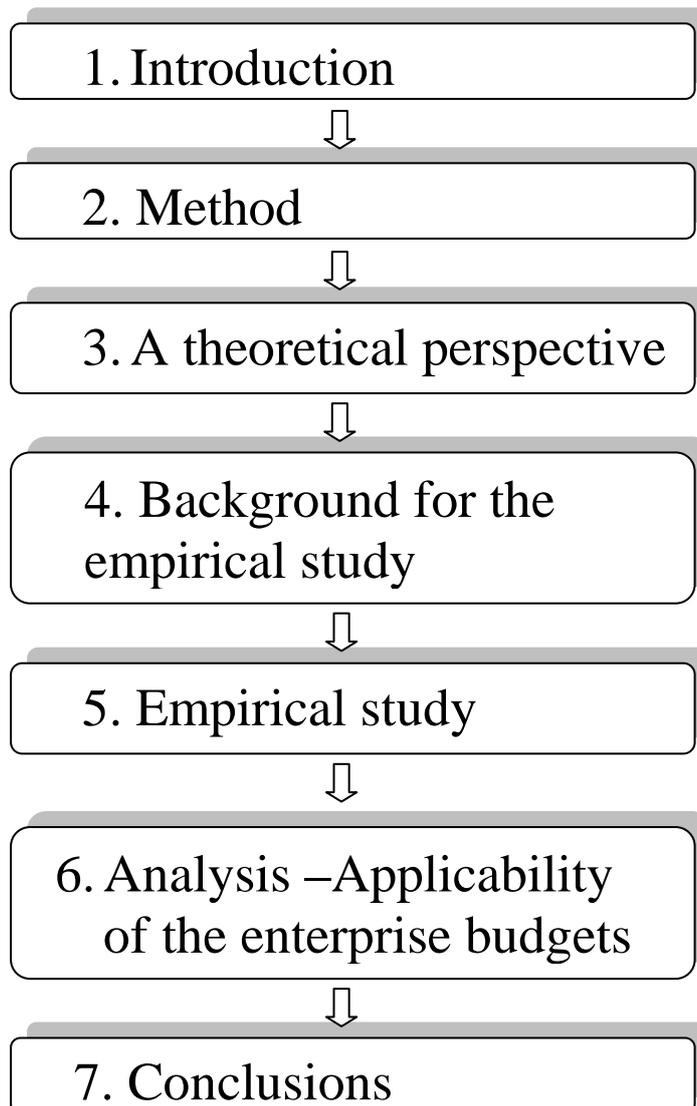
Figure 1.Illustration of the outline of the study

2 Method

Presented below (figure2) is the course of steps (components) of the used method-approach for the fulfilment of the aim of this study. The theories behind are motivated in the further chapter 3(the theoretical perspective).
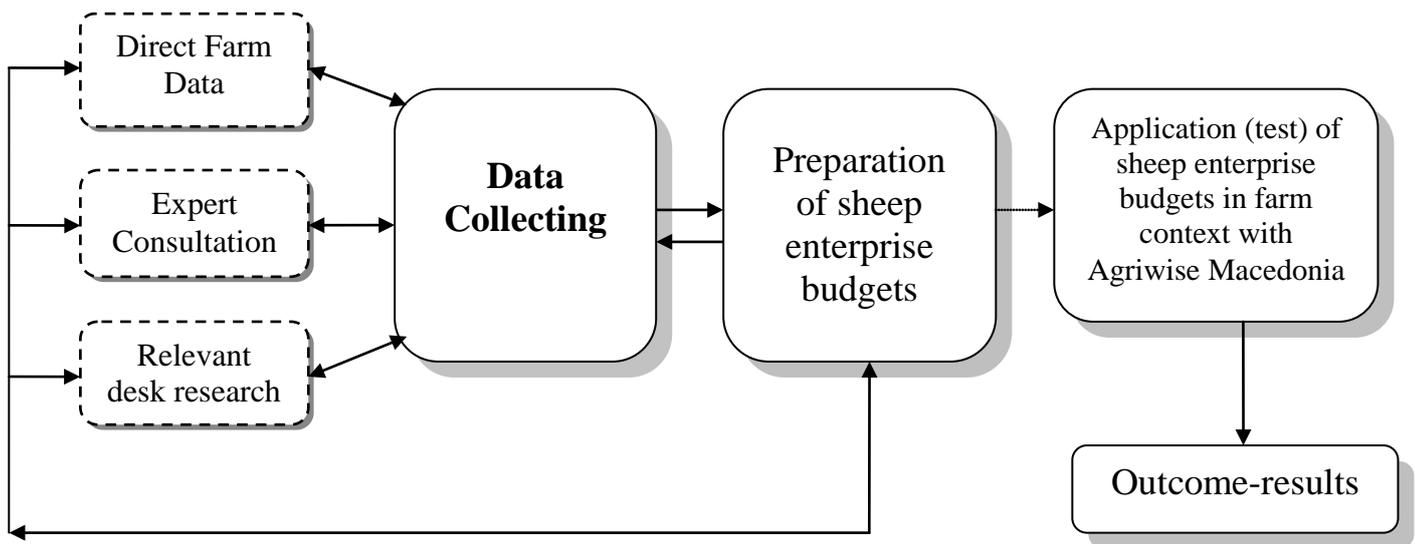
Figure 2. Illustration of the components used in method (approach) of the study.

2.1 Delimitations

Generally in Macedonia keeping farm records and farm business planning is not often practiced like an ordinary activity in farming. For the private family farms is not mandatory to keep farm records or create a farm accounting system. So for evaluation of the success and profitability of their production very often they are facing the problem of lack of information (Martinovska-Stojceska et al., 2010).

In the livestock production in Macedonia around 80% is kept by small private farmers which are not a part of any kind of information system (CR, 2003).

Recently there is a number of small private farms participate in a Farm Monitoring System (FMS) developed and conducted by the National Extension Agency (NEA). Around 300-400 farms are included in the FMS providing data concerning the farm income.

Subsequently it is difficult to compose a planning tool without accurate records about the previous work of the farm, where it can be reached only approximate data from the farmer's memories about it. But because it has to start from somewhere, this is a first approach with a provisional (uncertain) data.
Since there are only few cases to find farm records in Macedonia and data from some efficiency systems for measurement, to rely on the prosperous theoretical and practical experience of the expert's was taken as a most relevant measurement for the creation of the

sheep enterprise budgets in favour of the production traits, the feed consumption as well as the expenses of breeding sheep.

Like a possible alternative way of how the sheep enterprise budgets would be created-approached for the aim of this study could be a use of analytical calculations from the neighbouring Balkan countries as a basis, and a comparison with them.
Pramenka sheep breed belongs to the group of oldest domestic animals in Balkan Peninsula and in Southern Europe and the genomes of it are spread in these regions. But there are lots of differences and variations in the types of breeding as well as the production traits (CWBPSBT, 2006).
But this approach did not take place in this study because of two reasons:
- Time consuming and complicated task to be fulfilled for the expect time of approximately 20 weeks of work to conduct the thesis;
- Differences in the structure of these calculations because of the variations in production traits and ways of breeding and different prices as well.

In the European countries it is a frequent practice to do experiments (or tests) in livestock production. For example in Sweden in the cattle production there are measurements (on a daily basis) about the influence of the consumption of feed on milk production.

Unfortunately this is not a case in sheep production in Macedonia, so this kind of data was not available to use.

2.2 Data Collecting

The process of data collecting consists of direct farm data (for the case studies), expert's consultation and relevant desk research, as well as a literature study.

The aim of doing it was to attain more accurate calculations of the enterprise budgets, which will result in a more precise outcome in the farm business plan model Agriwise Macedonia.

2.2.1 Direct farm data

The direct farm data was gathered from field trips to agricultural company and family farm in Macedonia, chosen by the communicated experts in this sub-sector. The purpose of it was to check and compare the practical effect with the given theories for the production level and some characteristics of the local sheep breeds. Also to make a case study and test the applicability of the composed sheep budgets in Agriwise Macedonia farm business plan model.

2.2.2 Expert consultation

In order to check for the previous gathered data from farms and the desk research, and obtain more insight details and practical experience it were consulted experts in this sub-sector from the Faculty of Agricultural Sciences and Food in Skopje, as well a sheep production advisor from NEA (National Extension Agency) in Bitola.
The aim of doing it was to obtain more precise figures about the production traits, the feed consumption as well as the costs for the both (current and accelerating lambing) systems in sheep breeding and with that to attain more accurate calculations of the enterprise budgets.

2.2.3 Relevant desk research

First of all to get a broad understanding about the farm management and planning with the economic terms and tools for doing it, along with creating enterprise budgets and farm business model. Relevant literature search is presented in the following chapter (see chapter 3).

To get a broad perspective of terms and normative in the sheep breeding it desk research on some relevant publications in this field was made, as well as expert's consultations (as it was previously mentioned).

With intention to obtain relevant market prices data was gathered from monthly and annual reports of the State Statistical Office and the statistical yearbooks, as well as from the official web site of the State Statistical Office of Republic of Macedonia.

2.3 Sheep enterprise budgets

For the fulfilment of the aim of the study two types of sheep enterprise budgets are composed. One type of budgets is with the accelerating lambing system and another with the current (traditional) technology of production.

The accelerating lambing system of production is taken like potential system of breeding for Macedonian conditions, as a suggestion from the expert's side.

The sheep enterprise budgets are created on the best production traits for Macedonian conditions of breeding. The calculations of the budgets are based on the gross margin method of calculation (see chapter 3).

The enterprise budgets are applied into the farm business plan model Agriwise Macedonia with the aim of testing the applicability in farm context in order to check and compare the average profitability of the two types of technologies of production.

2.4 Agriwise Macedonia

The Agriwise model was developed by the Department of Economics at SLU like a decision support system for farm business planning and it's widely used in Sweden.

It is a flexible program which allows analysis of a certain company and also can be suitable for a newly founded and investment business.

The Agriwise model comprises crops and livestock enterprise budgets created for the frequently used lines of production, and farm business planning computer program.
These enterprise budgets used in the model Agriwise cover three different levels of separate costs:

- ✓ Separate costs 1 - seed, fertilizer, plant protection, land cultivation, irrigation, packaging, transport;
- ✓ Separate costs 2 – separate costs 1+machinery maintenance and interest of working capital;
- ✓ Separate costs 3 – separate costs 2+depreciation+interest of direct machinery, direct labour not included in separate costs 1.

As a result on this there are three levels of gross margins. These gross margins are calculated as:

Gross Margin = total incomes - separate costs

"And it is calculated correspondingly for each of the three levels of separate costs" (Öhlmer et al., 2010).

The Agriwise model is organized in three segments:

1. Main model (compilation of the whole farm income and costs);
2. Report (calculated results, balances and ratios);
3. Support model (aims at assisting the estimation of specific data).

The incomes and costs common for two or more enterprises are added in the main model after the separate incomes and costs of all the enterprise budgets have been summed up (www.agriwise.org, 1).

This model was accepted and adjusted to Macedonian conditions like Agriwise Macedonia. The adjustments are mainly concerning the farm enterprise budgets and the structure of the budget sheet. Agriwise Macedonia also contains sensitivity analysis of the used inputs, gross margin and the break-even price and yields at separate costs 1. The aim is to be appropriate and useful for a wide group of users with aspiration of creating a plan on working with agriculture (Öhlmer et al., 2010).

3 A theoretical perspective

In order to fulfil the aim of the study and model used, the following text will be focused on the planning management function and its tools.
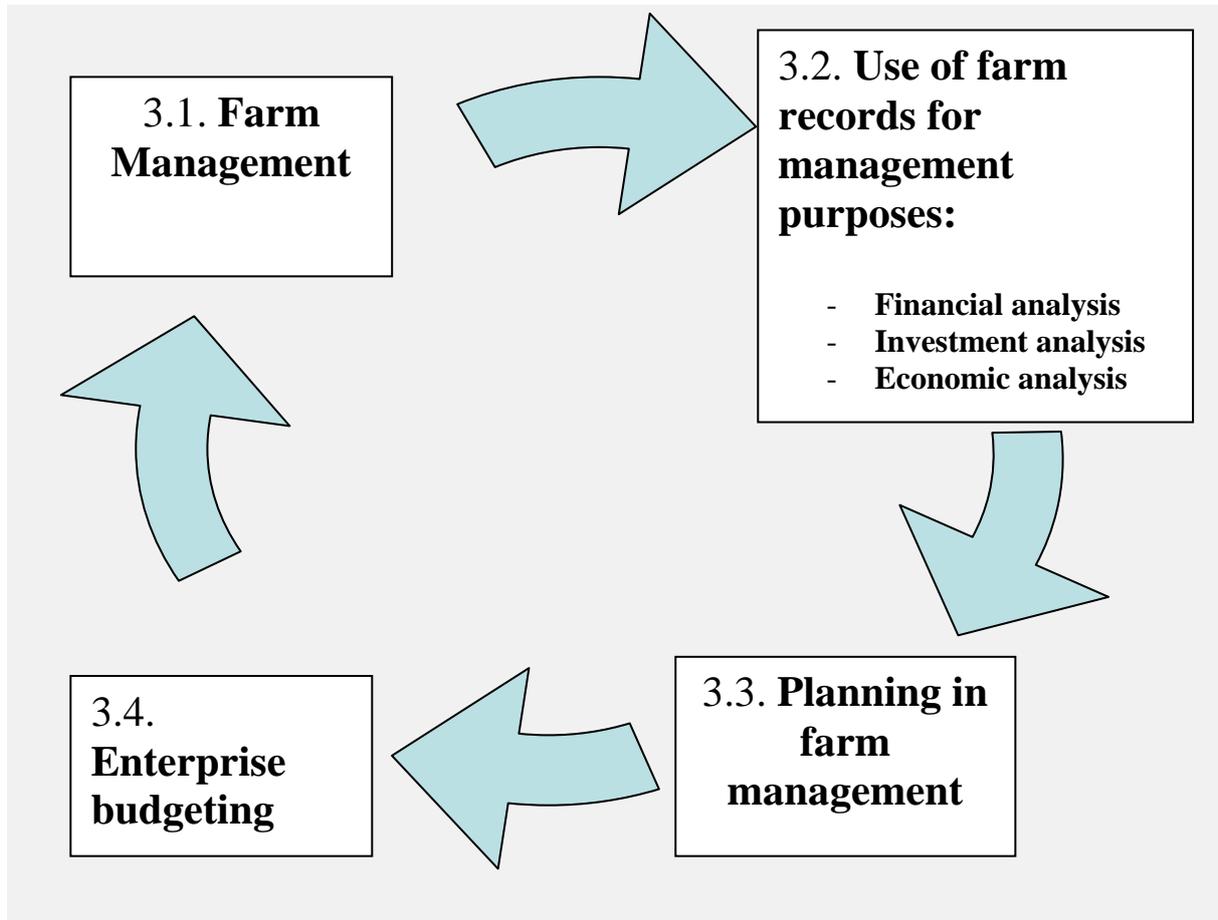
Figure 3.Illustration of circulation of presented theoretical perspective of the study (adjustment adopted from Martinovska-Stojceska, 2007, 98)

3.1 Farm management

According to Jones & George (2008, 5) management can be defined as planning, organising, leading and control of the human and other resources, for effective and efficient achievement of the organizational goals. The role of management in the organization is to help the organization make the best use of its resources in achievement of the goals.

Robbins and DeCenzo (2001, 5) define the management like 'a process of getting things done, effectively and efficiently, through and with other people'. With efficiently it is meant doing it rightly and effectively means doing the right thing.

Farm management it's not separated from the world of management and most of the given wide definitions of farm management put an accent on the four crucial management functions.
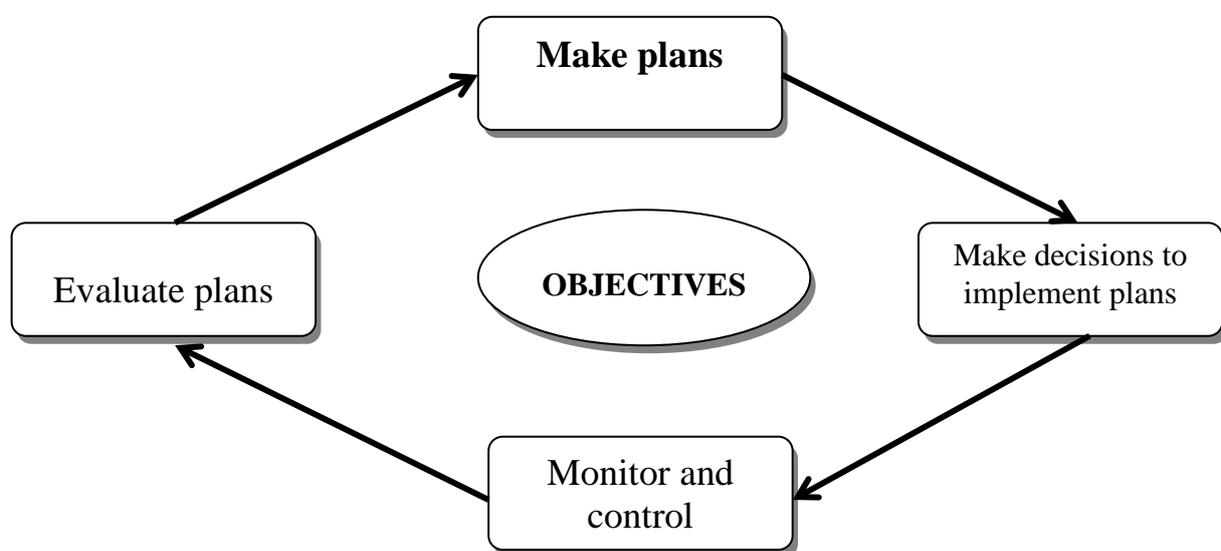
Figure 4. The basic management functions (according to Turner & Taylor, 1998, pp.2).

In the agricultural literature there are lots of definitions for farm management, but most of them point out the following:

"In its simplest form, management means making the best possible use of available scarce resources-land, labor and capital-to achieve the objectives set" (Turner & Taylor, 1998, 1).

It is a dynamic process involving responsibility for the effective operation of a business, which engages setting up and implementing procedures to ensure adherence of plans and the selection, furthermore leadership, motivation and control of the people involved in the business (Turner & Taylor, 1998).

In accordance with the stated above, the most important circumstance to have a good management is to put into practice these four crucial managerial functions, which are intertwined, in an effective and efficient manner. That will help in making the best use of the available resources and lead to achievement of the wished/set organizational goals.

"Understanding the operation of businesses that deal with agricultural goods and services is enhanced markedly by an understanding of the agricultural aspects of the production of such

goods and services. This is because the nature of agriculture- the biology, the markets, the seasons, the risks and uncertainties-impose a special set of conditions and requirements on the management of business related to agriculture"(Malcolm et al.2005, 62).

Because of the environment in which it operates, enclosed with uncertainties and demands as well as the changing natural conditions, "**farm management is a complicated and demanding task**" (Olson 2004, 6). This operating environment according to Olson (2004) can be put together into four key components:

1) *Resources* (those that are available for the farm like: land, labour, management skills, the farm's climate and weather, capital etc.);

2) *Markets* (where outputs and inputs are sold and bought, where prices are discovered);

3) *Institutions* (those that affect the farmer's choice like: government with its policies and regulations, as well as banks and other credit institutions) and

4) *Technology* (biological, physical, and mechanical processes and techniques which affect the productivity as well as profitability of the farm, and the management knowledge and information needed to use them).

To be (Kay et al., 2008) competitive and successful in farm business it's not enough only a process of doing things right in farming, but also to do the right things. What suppose to be the right thing at the right time for a certain business is job for a strategic management.

The most important condition (Turner & Taylor, 1998, 1) in successful farm management is paying attention to all the details in all aspects of husbandry permanently and under any given circumstance of the farm business. Good and successful farm manager learn to continually rethink his/her decisions in accordance with the economic, environmental as well as technological changing conditions.

3.2 Use of records for management purposes

To plan a certain future activity there is a need of records about the previous work in the farm (organization) which will be used like a starting or reference point for the future management activities in the farm.

Unfortunately in Macedonia farm business planning it's rarely practiced like an ordinary activity in farming. Private family farms are not obliged to keep farm records or compose a farm accounting system. Consequently very often they are facing with a problem of lack of information for evaluating the success of the farm and profitability of their production; as well sustain the process of decision making and farm business planning (Öhlmer et al., 2010).

"Until the period of transition bookkeeping and performance recording was committed on regular base on the large state owned farms only. Although some 80 % of the livestock has been kept by small private farmers, they have never been a part of any information system. Up to 1988 the all data had to be directed into Institute of Animal Science. However, the large majority of the data was kept on farm. Since the transition faced the large state owned farm with economical problems, most of them simplified the whole system, neglecting bench of important information" (CR, 2003, 16).

"Use of the farm records for management purposes (Turner & Taylor, 1998, 14):

✓ To assess the physical and financial performance and to analyse it;
✓ To assess progress over the past years;

- ✓ To reveal strengths and weaknesses in the business;
- ✓ To establish a base for planning changes in the business and to determine the likely effect of any changes made;
- ✓ To facilitate monitoring of performance and instil discipline in moving towards the fulfilment of targets, which have been set as a result of the recorded information from the past three to five years".

Record keeping is a necessity in every business and in farming as well. Good records are the simple and precise records for the both sides-their creators and users, presenting a core part of the farming and any other business. Despite of their use the records have to: serve a definite purpose; be accurate and up to date; be easy to complete; be easily stored and readily accessible. For keeping records and accounts there are two main reasons (Turner& Taylor, 1998):

1. Mandatory (legal requirements)
2. Management purposes (**analysis-financial and economic; planning**)

3.2.1 Financial analysis

There are lots of methods (Öhlmer et al., 2000, 141) for measuring the resource status, outcome and the consequences of the business, but the accounting is the only one applicable for the whole firm.

 "Financial analyses are based on the cash flow analysis. It is done at the end of the year, usually by an advisor or accounting service bureau and based on the accounting data. The advantage for the manager of doing this method is that it is easier for him/her to understand cash flow variables than the economic variables, and there are no additional measuring, estimations or evaluations because all variables are based on accounting data " (Öhlmer et al., 2000, 143).

To observe the financial position and performance of the farm business there is a need for doing financial analysis, with a set of financial statements. There are three main (Olson, 2004, 190) financial statements which project the growth toward the persons and business set goals, and allow calculation of business profitability, solvency and liquidity:

1) Income statement
2) Balance sheet
3) Cash flow statement.

According to Olson (2004, 189) the financial position of the business refers to the total resources controlled by a business and the maintenance against those resources. The financial performance of the business alludes to the results of decisions over time.

The aim of any financial analysis is finding a potential problems and opportunities in the business environment, so as to develop probable solutions and operating plans for their solving. Usually the symptoms for the actual problem or opportunity are seen first, not the problem itself, so the possible solution cannot be implemented directly. Therefore finding the symptoms for this problem is the first step and then it follows exploring and analysing the business in depth in order to find the problems which need to be sold. To find the areas of the possible problems and opportunities should be used *initial analysis*, where it shouldn't be analysed everything. Also there is no need for calculation of every possible measure and ratio of the business, because that will just confuse the analyst. After detection of the problem or

opportunity (with the initial analysis) it follows a structured *diagnostic analysis* where a set of steps are done (Olson, 2004, 189-226).

Another important fact is that financial statement should be interpreted with regards to the history of the farm and its environment, the current conditions and the expected future, objectives and goals (Olson, 2004).

3.2.2 Investment analysis

"The basic economics associated with any input use decision revolves around the relationship between costs and returns. Normally the firm is assumed to be a profit-maximizing and seeking to buy and work with those assets for which the difference between expected returns and costs it's the greatest. (Drummond & Goodwin, 2004, 19-20).

"**Investment analysis**, or **capital budgeting** as it is sometimes called, is the process of determining the profitability of an investment or comparing the profitability of two or more alternative investments. A thorough analysis of an investment requires four pieces of information: 1) the initial cost of the investment; 2) the annual net cash revenues realized; 3) the terminal or salvage value of the investment, and 4) the interest or discount rate to be used" (Kay et al., 2008, 299).

Except of the annual operating inputs like feed, fertilizer, seed etc, on the farm there is a need for a capital which will be invested in capital assets like land, buildings and machinery. In accordance with the timing of the expenses and returns there are different methods for investment analysis.

Since these investment decisions are not set often, more time and accurate analytical techniques should be used. To do a proper capital investment analysis entails a careful reflection on the size and timing of the cash flows, which is of great importance in achievement of the best possible economic outcome with a long-lasting consequences (Kay et al., 2008).

Because the capital assets like machines are not used for the entire period of production they can be purchased, rented or leased, so the decision on how to use these assets it's more complicated then the use of other inputs. That's why it is important to make a proper reflection on this and see which way is the best to do that (Olson, 2004).

The basic concept used in the investment analysis is the time value of money.

The *time value of money* is expressed as an interest rate and is based on how much people are willing to pay to use someone else's money for a specified period. It is calculated in four ways:

1. **Compounding** –simple process of adding interest to a beginning amount, where the present value and interest rate of the investment are known and from there it is calculated the future value of the investment.
2. **Discounting** – opposite of compounding, where the interest rate is discounted from the given future value in order to calculate the present value of the investment.
3. **The present value of annuity** – in some investment problems there is a need of comparison with an annuity to be received in the future, and it is the same amount per period for several periods.
4. **Amortization or capital recovery**- loans that last longer than one year and have annual payments or loans that have multiple payments per year; have their loan principle amortized over the length of the loan. To calculate it, the loan principles

suppose to be known, the quoted interest rate, the length of the loan and the number of payments per year"(Olson, 2004, 252-258).

Olson (2004, 258-259) describes the investment analysis as a series of five steps:

1. Identify investment alternatives;
2. Estimate streams of incomes and costs through time;
3. Evaluate the economic profitability and financial feasibility of investments;
4. Sensitivity analysis through scenario analysis;
5. Select investment(s).

Investment analyses are made in order to identify the *economic profitability* of the investment and the *financial feasibility*. Indicators for measuring the economic profitability are: payback period, net present value (NPV) and internal rate of return (IRR). The financial feasibility shows if the investment generates enough cash flow to meet the required needs of cash (including loan payments) at the right time (Olson, 2004).

To do a systematic investment analysis or comparison with an alternative investment, except of these basic procedures and methods some additional factors like *income taxes, inflation and risk* have to be included as well.

3.2.3 Economic analysis

According to Malcolm (2005) a more practical solution to use is to solve the whole problem in an estimated manner, than to solve ideally just a small component of the problem and to leave a lot of important parts unrequited.

"Thus economic analysis is an interdisciplinary activity: the technical basis of agricultural economic analysis has to be sound, with the human element included, the economic and financial aspects enumerated, the risk elements considered, and the institutional factors acknowledged. The aim of agricultural economic analysis is to put the components of a system together into a whole, even if a simplified whole, but one in which all the elements that have an important bearing on the question are considered" (Malcolm et al., 2005, 74).

It can be said that the financial statements are the base for the economic analysis. The difference between them is that the financial records can be and are used for the mandatory (legal) requirements and for the management purposes. But the economic records, like the profitability statement cannot present the 'real' performance of the business; they serve just like an internal tool for measurement of the economic outcome of the certain business.

3.2.4 Evaluation of the economic outcome

In the short run (Öhlmer et al., 2000, 152-153) the survival of the firm depends on the investment plans, solvency, liquidity, possible debt level and the solvency goal. For that reason in the short run analysis and planning there is a need of an economic outcome measurement, which is internally generated capital i.e. outcome before depreciations minus net interests, related to the financial situation.

The economic analyses are simple and quick because the data is taken directly from the accounting without adjustments. But since the tax law is used in the accounting system, the depreciations and evaluations of the assets may be done so as to reduce the tax and not to measure a sustainable economic outcome. For that reason the following accounting data suppose to be adjusted: the store evaluation; the depreciations; the cost of own work and

capital; the maintenance costs and extraordinary payments. After these adjustments an accurate evaluation of a sustainable income can be done.

The Lever formula

"The financial risk is measured with the lever formula. It is the lever formula because the ratio between debts and net worth is called lever. The Lever formula expresses the relation between solvency, capital profitability and debt interest rate:

$$R_E = R_T + (R_T - R_S) * S/E$$

Where:
R_E = Profitability of net worth (i.e. owner capital)
R_T = Profitability of total assets
R_S = Interest rate of debts
S = Debts
E = Net worth
S/E = Debts divided by net worth

The manager is interested in high R_E. According to the formula high R_T is a good sign, and if R_T is greater than R_S the difference between them will be magnified by the ratio between debts and the net worth. If more capital is borrowed at R_S and invested in activities yielding R_T the higher R_E. But if R_T is lower than R_S, there is a risk that R_E will become negative. The amount of this risk will depend on the debt level compared to the net worth level" (Öhlmer et al., 2000, 154).

The du Pont formula

"The profitability of total assets (R_T) is defined as *'Outcome after financial incomes and costs (P) plus interest costs (I)/ total assets'* and its calculated in the profit and lost statement. All inputs should be deducted, even the costs of own work, so it is equal to outcome before depreciations minus depreciations (or reinvestments) minus private withdrawal (including taxes). The interest cost (**I**) is added to measure the profitability of total assets. (Profitability of resource is the profit divided by the use of this resource).
The formula:

$$R_T = \frac{Turnover}{Total\ assets} * \frac{P + I}{Turnover}$$

is called the du Pont formula after the person that formulated it and it is derived from the definition of total assets (**R_T**):

$$R_T = \frac{P + I}{Total\ assets}$$

which is multiplied and divided by the turnover"(Öhlmer et al., 2000, 155).

<u>The du Pont system</u>

"The turn over divided with total assets is the capital turnover rate (CTR), or how many times the total assets are 'turned over' per year. The total assets should be the average of the year, and not the outgoing balance.

The outcome after financial incomes and costs (P) plus interest costs (I) divided with the turnover is the capital gain margin (CGM), or the portion of all incomes that is left to pay the capital and the profit.

High profitability of total assets (R_T) **is** good, and it becomes higher if either CTR or CGM becomes higher.

CTR can be increased if less capital is tied up i.e. capital rationalization. 'Just in time 'concept is an example of improving CTR by decreasing the store values.

CGM can be increased if the costs are decreased i.e. cost rationalization.CTR and CGM can be divided further like presented in the Du Pont system (see figure 5). CTR may be improved by decreasing the level of cash, customer credits or stores. CGM may be improved by decreasing the variable or fixed costs" (Öhlmer et al., 2000, 156).
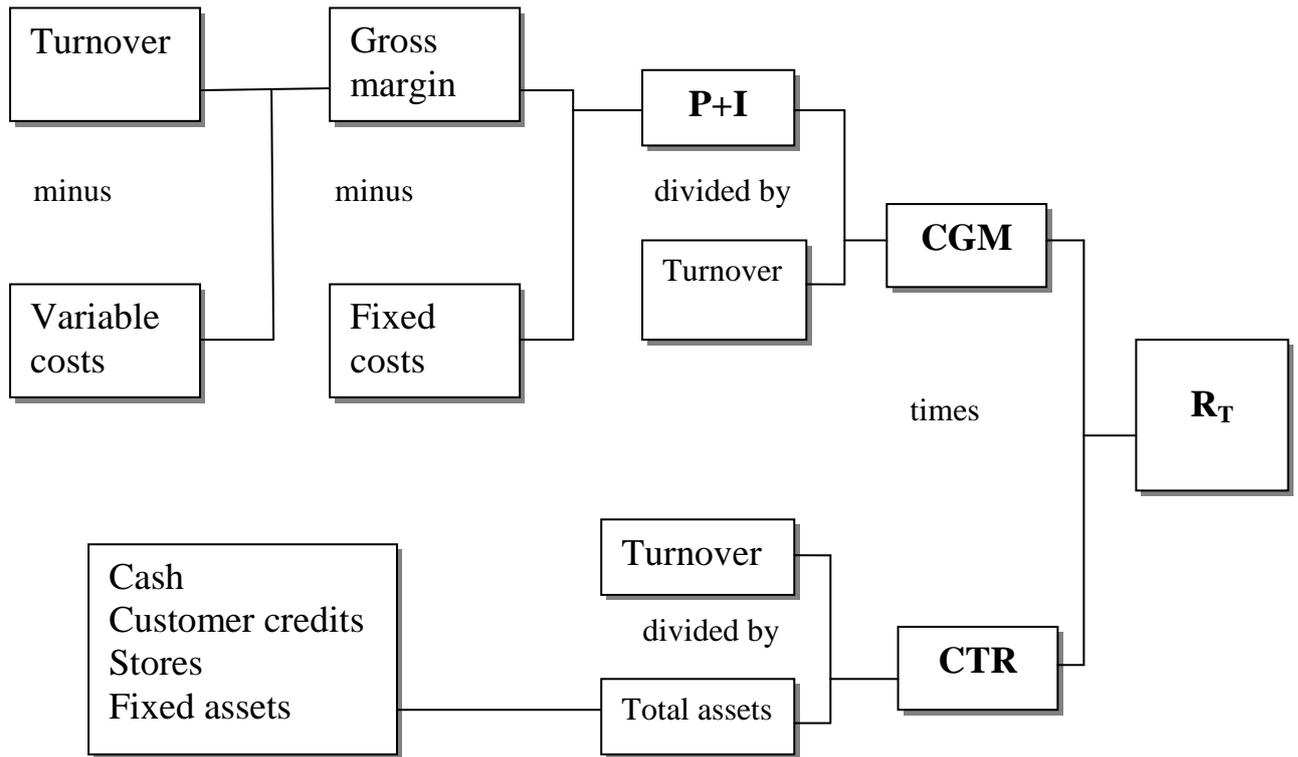
Figure 5. Du Pont system (according to Öhlmer et al., 2000, 156).

3.3 Planning in farm management

Mintzberg (in Cook&Hunsaker, 2001) says that organizations need to plan, but he also indicates that planning should not be treated like 'mechanistic, highly analytical, and formalized process to be delegated to the staff'; it should start when managers begin to lead.

Kay et al. (2008) represents planning like the most fundamental and important management function in the farm business and divides it into two broad categories:

- *Strategic management* -consisted of planning the long-term actions of the business activities; and

- *Tactical management (or operational)* - contains short-run actions to keep in track with the chosen goals in order to reach the planned aim of the business.

Öhlmer et al. (2000) defines it like arranging beforehand, consisted with prediction of the environmental changes concerning the activity which should be preformed, and development of action how it should be preformed. Also predicting and evaluating the consequences of that activity. So for example if a production activity is planned, the plan can take into consideration the choice and volume of output that should be produced, and also the combination and volume of input that should be used in the production process.

The agricultural production is highly depended on the weather conditions and sometimes there are some unpredictable and unexpected changes in the nature (for example earthquake, flooding etc.). Since planning is based on the information available at the moment of planning, some of the future activities and consequences can be just given like uncertain predictions with leaving space for future changes in them, so different activities in farm can have a different duration of consequences (Öhlmer et al., 2000). Therefore in planning it's important to be aware about the crucial factors for future choices and according to that create a system which will allow a continually collection of this important information and do re - planning if needed.

Öhlmer et al. (2000) defines planning in a firm along with the portion of the resources which are variable (from a time perspective) and the portion of the resources that are affected. In relation to this he divides planning into:

- *Long run* - Strategic planning of the whole firm;

- *Intermediate run* -Tactical planning of the whole firm;

- *Short-run* -Operational planning of 1.) separate enterprises and 2.) the whole firm.

According to Turner & Taylor (1998, 4) it is necessary to plan ahead so as to use the available time most effectively (especially in the peak periods); optimize the physical effort and use of machines; to avoid wastage and loss in order to reduce costs and maximize profit. Thus planning is making more work done in an easier, safer and more organized way, which makes it more enjoyable and effective, at the same time improves the output and saves time.

Organization of the planning procedure (Öhlmer et al. 2000, 211) is divided into the following seven steps:

1. *Detecting the need of organization planning* as an involvement of: an analysis of control points or accounting reports; a strategic plan or a goal analysis;

2. *Determining the planning period* (the amount of all fixed resources, which resources that delimit the production opportunities of the firm etc.);

3. *Develop gross margin budgets*, showing the calculation and need of resources valid for relevant enterprises during the planning period;
4. *Develop a different organization alternatives*;
5. *Estimate the profit, cash surplus and financing of each organization alternative*;
6. *Choose the proper organization alternatives*, in accordance with the set goals of the firm, that will gave profit and other achievements;
7. *Determine the crucial factors* which will affect the performance of the chosen organization alternative, and if needed plan the implementation of the chosen alternative.

According to Öhlmer et al. (2000, 211) the complete organizational plan should be consisted of the following components:

✓ Description of the firm and its environment;

✓ Gross margin budgets i.e. enterprise budgets;

✓ Summary of gross margin budgets;

✓ Choice scheme;

✓ Various organization alternatives;

✓ Summary of organization alternatives;

✓ Profit, cash flow and financial consequences;

✓ Summary of plans;

✓ Choice of plan and determination of factors to check.

Olson (2004, 8) characterizes planning like "intended strategy and course of action for the business". In general he divides the basic process of planning in the following steps:

1. *Estimation of* the business owners and operators *goals and objectives*;
2. *Assessment* of the industry in which the farm will operate;
3. *Registration* of the available farm resources and analysis of the farm's situation within the business;
4. *Selection of alternatives* to be analyzed;
5. *Determination* of the physical inputs and probable production for each alternative;
6. *Selection of prices* which should be applied to the input and production data;
7. *Calculation* of the expected returns and costs for each alternative;
8. *Estimation of the potential range of costs and returns* due to variability of prices, costs and yields i.e. sensitivity analysis;
9. *Analyzing the potential results of the alternatives* i.e. sensitivity analysis;
10. *Developing an operating plan* based on potential results and the goals of the business, manager and (or) owner i.e. sensitivity analysis.

Olson (2004, 8) considers a part of the planning like reference point in evaluating the outcome of the plan, or feedback control because a lot of times plans need a revision and modification in order to reach the wanted results.

Most important aspects of the planning situation (Öhlmer et al. 2000, 218):

• The aim of the planning;
• The length of the planning horizon;
• Which resources that are available and at what levels;

- Which parts of the firm that will be affected;
- Which economic measurement that should be maximized;
- The managers minimum requirement of income from own work and capital;
- The managers like or dislike of various enterprises and his/her risk attitude.

3.3.1 Planning (economic) tools

Olson (2004, 9) considers economic analysis methods, budgets, and information on the physical needs and responses of plants and animals like tools of the planning process. Budgeting with its economic information (Olson, 2004, 85) can be of great support for the manager in making a decision regarding an annual plan, a production period, or a long-run plan. But it can be used also in all phases of management: planning, organizing, directing and controlling. Economic tools contain micro and macroeconomic principles, investment analysis and other financial tools, price forecasting, operations scheduling, risk management and other techniques.

"**Budgeting** is often described as 'testing it out on paper' before committing resources to a plan or to a change in an existing plan. It is a forward-planning tool or a way to estimate the profitability or feasibility of a plan, a proposed change in a plan, or an enterprise, before making the decision and implementing it"(Kay et al., 2008, 159).

According to Olson (2004) income and expense are the basic components of budgeting and it is important to correctly understand and use them in order to develop an effective budget.

"**Income or revenue** is a value that is or should be received in return for goods or services. An **expense or cost** is a charge that is or should be made for an item used in the production of goods and services" (Olson, 2004, 86).

"In planning the economic activities, fixed and variable costs are important concepts. **Fixed costs** are the costs which are not affected with the level of activity (measured in terms of e.g. output quantity) and remain the same even if there are no activities. **Variable costs** are the costs which change with the level of activity and will be zero if there are no activities" (Öhlmer et al. 2000, 204).

Fixed costs are especially important for the business when suppose to be allocated to each produced unit and that affects the calculation of economy of production and price cost per unit of the gained outcome. With dividing the total amount of fixed costs (TF) with the quantity of production (y) we will get the average fixed costs per produced unit (t_f) or (Milanov & M. Stojceska, 2002, 200):

$$t_f = \frac{TF}{y}$$

The variable costs are mainly the costs which emerge from the material used for the production, like costs for seed, feed, fertilizers etc. and the cost of labor used. Depending on the change and level of use of the production capacities, the total amount is rising or decreasing continually. To calculate the total amount, or the average of variable costs, the following equations can be used (Milanov & M. Stojceska, 2002, 195):

Total amount of variable costs: $TV = t_v * y$

Average variable costs:

$$t_v = \frac{TV}{y}$$

where: **TV** – total variable costs;

   tv- average variable costs;

   y- the amount of production

"Budgets (Olson, 2004, 9) report the quantified estimates of expected results and there are four main types:

1. **Enterprise budgets** (expected costs and revenues for specific enterprises);
2. **Whole farm budgets** (expected costs and revenues for a specific combination of enterprises);
3. **Cash flow budgets** (a record of cash transfers into and out of the business listed by a specific period);
4. **Partial budgets** (a listing of only those costs and returns expected to change due to a proposed change in the business)".

3.4 Enterprise budgeting

"Each crop or type of livestock that can be grown is an enterprise. A whole farm plan often consists of several enterprises, so **enterprise budgets** are often called the 'building blocks' in a whole-farm plan and budget" (Kay et al., 2008, 160).

"Enterprise budget can reflect pecuniary economies of size. It is a planning document that specifies what might happen and also what almost surely will not always take place. The *marginal rules* are playing a key role in making the enterprise budgets a more effective aid to farm planning" (Debertin, 1986, 300).

The main utility of an enterprise budget is projection and estimation of the planned returns, costs and profit per unit for the given enterprise. With its great amount of data, the enterprise budget can be used like a functional management planning tool in the future projection of similar operations. That is useful in making many types of decisions and choice of a more profitable enterprise in the whole farm plan. Managers can use the enterprise budgets for identification of the possible costs and expected profit from a specific production, also in evaluation of the potential options in choice of necessary resources and determination of the break-even prices or yields of the certain production (Kay et al., 2008).

Since the enterprise budget is consisted of information about some specific resources connected with a certain used technology in the production process, building it entail understanding of the both sides-the production and economic conception (www.okstate, 2010).

"Most enterprise budgets are **economic budgets**" (Kay et al., 2008, 161).
This means that except of all fixed and variable expenses; they also include some opportunity costs, like operator labour, capital and management. Therefore, the profit or return shown on an enterprise budget is an estimated economic profit. This is different from accounting profit, where opportunity costs are not recognized. Enterprise budgets suppose to be the future projection of manager beliefs concerning the gross returns, profit and costs (ibid).

3.4.1 Content, organization and structure of an enterprise budget

Since this planning tool is the basic content in this study which was applied into the farm business planning model Agriwise Macedonia, it will be described in more detail in the text to follow.

Despite of the purpose of the enterprise budget, it should be based upon completion of few principles (Milanov & M. Stojceska, 2002, 236-237):

- ✓ *Principle of completeness* – which means to cover costs for all individual stages of production of the certain product, after earlier grouping, because there should be expressed all the changes;

- ✓ *Principle of time distinction* - costs are appearing in different time periods of the year. For example there are purchases, which were made the current year, but suppose to be incorporated the next year. So following this principle will to a large degree increase their proper distribution;
- ✓ *Principle of differentiation-grouping* – with the classification by their functional affinity into a group of separate costs it is assigned a more successful easily and applicable use. For example the separation of costs for recruiting animal, alfalfa, barley, pasture, concentrates for lambs and so on into a group of separate costs1;

✓ *Principle of documentation* – without a proper documentation the enterprise budget will get a hypothetic character and will lost its meaning. Therefore it is important for the enterprise budget to be based on previously created precise and accurate normative for the production level and costs of the given production;

✓ *Principle of comparability*- with a determined structure of costs of the enterprise into groups, there is a possibility to compare groups of costs for similar products in the same enterprise, or between comparable different enterprises;

✓ *Principle of visibility*- this is an accounting rule which should be applied also in enterprise budgeting, which makes the budget easier to compose and follow.

At the top of the enterprise budget it's the name of the enterprise. It is consisted of the size and budgeting unit of the enterprise, products to be sold, and some other distinctive explanation of the inputs, like for example irrigation use.

Usually the enterprise budgets are constructed for a period of one year or less, but there are also some with longer production process where a multi-year budget is more useful (www.oces, 2010).

In addition it should be presented the date and version of the budget, and if it is a multi-year budget it should have the covered time (Kay et al., 2008).

Incomes with a quantity, unit and price are usually presented first in the enterprise budget. After that it follows the cost part and it's usually divided into separate (variable) and common (fixed) costs. Income above the separate (variable) costs presents *the gross margin of an enterprise* (Kay et al., 2008).

Income above direct or separate costs presents the *contribution margin* of the enterprise to cover the common costs of all enterprises, including fixed-common costs. Common costs include for example the common machinery like plough, harrow etc. which could be variable in same planning situation and fixed in other.
In the composed sheep enterprise budgets for this study it is called a gross margin which in fact represents the contribution margin.

The gross income in the enterprise budget, consisted of the level of output and price per unit of output, suppose to be obtained with multiplication of the price per unit with the expected amount of output for the planned period. The remained income after covering the specified costs in the budget is the income above costs. It can be calculated like income above separate (variable) costs or gross margin of the enterprise, and income above common (fixed) costs or deduction of the total operating costs from total revenue of the enterprise (MCE, 2010).

If the income above total operating costs is positive it means that the enterprise is economically rational and produces enough revenue for covering a part of the common (fixed) costs and all the separate (variable) costs. Moreover if it can cover the risk and management costs as well, that enterprise is self-supporting. But if it goes in a negative direction it means that the certain enterprise is not economically rational given that it doesn't produce enough revenue to even cover the separate (variable) costs of the enterprise. So elimination of it from the whole farm budget will contribute in reduction of the loss, or increase of profits in the overall operations (www.oces, 2010).

Operating (variable) or separate costs are the costs of the inputs used in the production, which vary with the level of production. The inputs used in the production, produced on the farm, should be calculated with their market value, because they have an opportunity cost- they would be sold if they weren't used in the production. The operating variable or separate costs can be classified as cash or non-cash (www.oces, 2010).

Fixed costs are those costs that are <u>not</u> dependent on the level of production, they are fixed and stay the same whether or not the output is produced or the income is low or high. They might be cash or non-cash in nature. The expenses like insurance on buildings; taxes etc are the cash fixed costs. And some expenses like depreciation and interest on the invested money which are foregone opportunities are the non-cash fixed costs (ibid). Or these are the common costs which are in common for two or more enterprises.

3.4.2 Livestock enterprise budget

An enterprise budget is referring to a point on the production function, then is a given herd size and production technology.
The construction of livestock enterprise it's much more complex than the crop enterprise, because of the internal transfers and replacements of animals and their different valuation (Turner & Taylor, 1998).

Given that the livestock enterprise budgets usually have a multiple products it is important to correctly identify, present and prorate all of the revenues from them. Also it has to be considered a herd replacement and there may be a home produced feed which also have to be calculated (MCE, 2010).

According to Kay et al. (2008, 160) some managers develop livestock enterprise budgets on a per head basis, while others take some typical size operation (like for ex. a 30-head cow-calf operation) as the basis for a budget. But these budgets, presenting a typical size operation, may not be precise enough for some other similar operation and there is a need for their further adjustment.

Most common budgeting unit for livestock is *one head*. But there can be also used some others like for ex.100 birds of poultry, or different typical sizes of the enterprise in order to reveal the economies of size.

The revenue in livestock enterprises is usually presented on a per head basis (www.oces, 2010).

Most of the livestock enterprise budgets are calculated for a *one year*. But there can be also some types, like for ex. swine, where the production period is shorter than a year. Therefore it is really important to make the calculations for all the revenues and costs in the budget for the same period.

Proper calculation of replacement of the producing animals is an important fact in building a livestock budget. Female or male replacements are more often raised in the breeding herd, but they can be purchased as well (Kay et al., 2008).

Another part of the costs in the budget is feed, which can be farm-produced or purchased. For the farm-produced feed, the valuations suppose to be the same as if it was sold on the market with calculation of its opportunity costs. Purchased feed it's much easier for calculation since there is no need to evaluate it because it already has a price. Here also should be included the expense for renting a pasture, or an opportunity cost if it is owned (ibid).

Ownership and operating expenses for the livestock facilities, machinery and equipment have to be calculated and divided in the enterprise budgets according to their proportional use (Kay et al., 2008).

The concept of cost of production can be a very functional when selling the products, because at any time the product can be sold for more than its cost of production and there will be a clear picture about how much profit was made (Kay et al., 2008).

3.4.3 Gross margin analysis - calculations

According to Debertin (1986) in the creation of enterprise budgets, the marginal rules are crucial for more effective support to farm planning.

"The term **marginal** relates to incremental changes – decrease or increase which arise at the border or margin of something. Any marginal change that is calculated or measured is a result of marginal change in some other factor. To calculate a marginal change of any kind, it is necessary to find the difference between an original value and the new value that resulted from the change in the controlling factor or the change in some value caused by the marginal change in another factor. Marginal analysis can be used to obtain additional information about the relation between the input used and the total physical product-TPP." (Kay et al., 2008, 111).

Marginal Physical Product (MPP)

"Marginal physical product (MPP) is the additional or extra total physical product (TPP) produced by using an additional unit of input, which requires measuring changes in both output and input. It is calculated as:

$$MPP = \frac{\Delta\,TPP}{\Delta\,input\ level}$$

where the sign "Δ" refers to "the change in". The numerator is the change in TPP caused by a change in the variable input, and the denominator is the actual amount of change in the input" (Kay et al., 2008, 111).

Marginal Revenue (MR)

"The profit-maximizing level of use of an input can also be found by examining the marginal or incremental changes in costs and revenue as more input is added. Marginal Revenue (MR) is defined as the change in total revenue or the additional income received from selling one more unit of output and its calculated with the equation" (Kay et al., 2008, 114):

$$MR = \frac{\Delta\,total\ revenue}{\Delta\,total\ physical\ product\ (TPP)}$$

Marginal Cost (MC)

"Marginal Cost (MC) is defined as the change in cost, or the additional cost incurred, from producing another unit of output. It's calculated from the equation" (Kay et al., 2008, 115):

$$MC = \frac{\Delta\,total\ cost}{\Delta\,total\ physical\ product\ (TPP)}$$

According to Debertin (1986, 300) the marginal analyses are the useful basis for appropriate numbers in an enterprise budget, which can be used in the determination of:

1) The proper output level;
2) The amounts and combinations of inputs that will produce at greatest profit or least cost for a given output level; and
3) The proper size of the operation.

The gross margin can be defined as gross income from an enterprise minus the direct or separate costs incorporated in achieving it:

Gross margin = income – direct (or separate) costs

The gross margin is not profit because since it does not include fixed or common costs like for example depreciation, interest expenses etc. which have to be met regardless of production volume (SS, 2009, 37).

Main use of the gross margins is recognition of the individual enterprise performance in the multi-enterprise businesses. It is possible with numbers from the profit and loss account and with some additional information to construct enterprise gross margin figures, which can be used for a management purposes (Turner & Taylor, 1998).

The basic common information for gross margin calculations according to Öhlmer et al.(2000, 217) is the interest rate, price level, division of costs into common and separate, and some common estimations such as costs of special machinery, costs of buildings, costs of traction and handling the manure.

Turner and Taylor (1998, 47-48) identify the following strengths of the gross margin system:

✓ Simple method of assessing efficiency;
✓ The required records and accounting are easy and quick;
✓ *It makes the farm planning relatively simple* because overhead costs are not included;
✓ It indicates the areas of straights and weaknesses in the business;

and weaknesses of the gross margin system (ibid):

o It does not produce a profit figure of each enterprise;

o Since enterprises create different levels of overhead costs it can be misleading to compare enterprises on a farm purely on gross margins, because they can have a different gross margin and their real performance may be no different;

o Profit is not proportional to gross margin. Not necessarily the increase of gross margin will increase the overall farm profit because the overhead costs may have risen faster.

These weaknesses can be handled by repeated calculations with different alternatives in a computerized farm planning system.

3.4.4 Variable and Fixed vs. Direct (separate) and Common (indirect) costs

Categorizing the costs into variable or fixed depends on the planning horizon. According to Öhlmer et al.(2000) because of the long planning horizon in the strategic planning most of the resources are classified as variable. Whereas in the short run planning there are resources that have a longer length than the planning horizon, so that's why they are classified as fixed costs like for example the depreciation and interest costs.

Direct and indirect costs are on the other hand in connection to a specific farm enterprise. "A cost object is any activity for which a separate measurement of costs is desired. In other words, if the users of accounting information want to know the cost of something, this

something is called a cost object. Examples of cost objects include the cost of a product, the cost of rendering a service to a bank customer or hospital patient, the cost of operating a particular department of sales territory, or indeed anything for which one wants to measure the cost of resources used. Costs that are assigned to cost objects can be divided into two categories: direct costs and indirect costs. ***Direct (or separate) costs*** are those costs that can be specifically and exclusively identified with a particular object. In contrast, ***indirect (or common) costs*** cannot be identified specifically and exclusively with a given cost object" (Drury, 2006).

In farm management literature usually authors use the variable and fixed costs classification, while direct and common classification of costs is more present in cost accounting literature.

Direct or separate costs are directly linked to a specific object in the farm enterprise. While the variable costs are linked to the production function i.e. are determined by the fact whether is or there is not production and at what level.

In enterprise budgets the concepts that fit planning situation are used more, therefore the term used in the composed sheep budgets is separate costs which basically refers to the definition of direct costs.
When using a planning situation what is variable cost will vary. What is direct/separate cost is the same, but will be better to use the direct/separate cost concept.

3.4.5 Opportunity cost

"Some costs for decision-making cannot normally be collected within the accounting system. Costs that are collected within the accounting system are based on past payments or commitments to pay at some time in the future. Sometimes it is necessary for decision making to impute costs that will not require cash outlays, and these imputed costs are called opportunity costs. An *opportunity cost* is a cost that measures the opportunity that is lost or sacrificed when the choice of one course of action requires that an alternative course of action be given up"(Drury, 2006, 37-38).

Enterprise and partial budgets are identifying the time value of money. That is done with a calculation of *opportunity costs* for the annual operating inputs and costs which are small because of the short period. But in long-run these costs are of great importance for the capital investments and they usually require a large amount of money spread in deferent periods of many years (Kay et al, 2008).

According to Drummond & Goodwin (2004) in the economics everything is about costs and returns.

"When available, we use market prices to determine economic value. When market prices are not available to estimate those values, we use the opportunity cost which is one of the more powerful concepts in economics. The **opportunity cost** is a measure of how much of an earning opportunity is foregone by using a resource in its current employment" (Drummond & Goodwin, 2004, 19-20).

In the enterprise budgets the used inputs in the production which are produced on the farm, should be calculated with their market value, because they have an opportunity cost. It means that they would be sold if they weren't used in the production (www.oces, 2010).

3.4.6 Estimation of Animal capital

According to Öhlmer et al.(2000) the animal capital estimation depends on the production means. If the animal has a both production means and product (raising animal) like for example the fattening pigs, chicken or beef. And another case is if the animal is used only as production means or stock of animal, like for example sheep, dairy cow etc.

In the first case where the animal has a double production means, the value of the animal will be the value at the start of the production period, or the animal value multiplied with the length of production period.
For example: we have a piglet with a market price of 30€ Let's say that the piglet is four months old, so the animal value at start will be equal to 30€*4 months/12 months = 10 € So 10 €is the animal value at start (Öhlmer et al., 2010).

In the other case where the animal is used only in production means (stock of animal) the animal value is the average value during the production period and its calculated as:

(The purchase cost + selling income) / 2

Since the production period is one year it is not necessary to adjust the length of production period (Öhlmer et al., 2000).

If we take a dairy cow as an example, here is how it will be calculated the animal capital:

(Heifer cost 500 €+ slaughter cow payment 300 €)/ 2= 400 €
So the animal capital is 400 €(Öhlmer et al., 2010).

3.4.7 Working capital

In the gross margin budget (Öhlmer et al., 2000, 162) the working capital is estimated with the standards method. The procedure of estimation gives the required working capital per produced unit and year, and it is done within a three steps:

1) each cost item is multiplied with its portion of incremental costs
2) the incremental costs are summarized
3) the sum of incremental costs is multiplied with the standardized percentage and the length of the transformation period

"The portion of incremental costs of each cost item is normally 100 %. However, some items may contain depreciations, interest costs or opportunity costs, which should not be included. Examples are capital costs and opportunity costs of acreage that may be included in feed prices or costs of machinery use. The standardized percentage expresses the average of required working capital during the year" (Öhlmer et al., 2000, 162).

The method is illustrated with an example in figure 6.
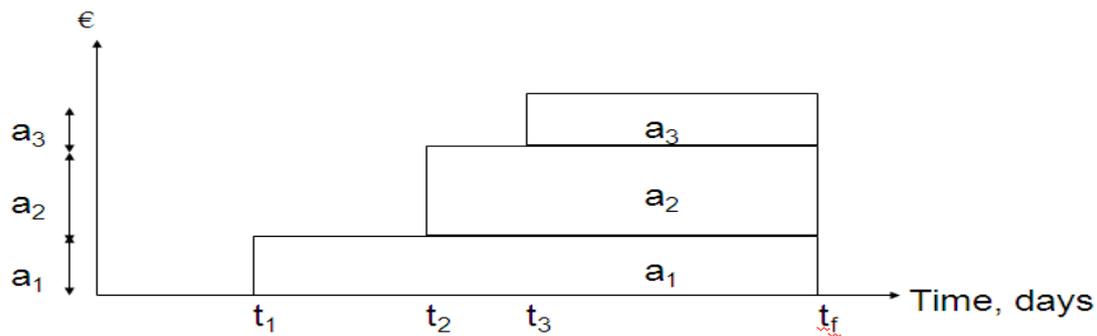
Example: Milk replacement (a_1) bought 030301 for € 27.20 for raising a heifer. Heifer finished 050201 => € 27.20 * 702 / 365 = 52.30

Figure 6. The average of required working capital during the year (according to Öhlmer et al., 2010, s.28)

t_1 = time of paying input a1
t_2 = time of paying input a2
t_3 = time of paying input a3
t_f = time of output payment
a_1 = payment of input a_1
a_2 = payment of input a_2
a_3 = payment of input a_3

So t_1 is when you pay the input and t_f is when you get paid for the final product.

3.4.8 Sensitivity analysis

"**Sensitivity analysis** is a method of looking, in advance, at the impact of variance from budget on ultimate profitability. So the impact of changes in performance level of key factors on enterprise efficiency and profitability should be considered" (Turner & Taylor, 1998, 94). Because always with the investments exists some uncertainty about the future prices and costs used in the evaluation of the net cash revenues it's useful to do a sensitivity analysis of the investment. It is a process of asking several 'what if'?-questions in addition to change of one or more values and recalculating the Internal Rate of Return (IRR) or Net Present Value (NPV) of the investment. With the recalculation the investor can get a picture about how 'sensitive' results the investment can give to the values being used. It will also involve the risk and better present the effects and probability that the investment will be profitable (Kay et al., 2008).

In general the records in any kind of enterprise budgets can be used to execute some types of analysis, like cost of production and estimation of the break-even analysis and yields.

'The break-even yield is the yield necessary to cover all costs at a given output price and it can be calculated with the following equation:

$$Break-even\ yield = \frac{Total\ cost}{Output\ price}$$

The break-even price is the output price needed to just cover all costs at a given output level' (ibid, 170-171):

$$Break-even price = \frac{Total\ cost}{Expected\ yield}$$

29

4 Background for the empirical study

The following chapter gives a brief introduction to the role and importance of the sheep breeding sub-sector in the Macedonian agriculture. In addition the production systems used and main type of sheep breeds in Macedonia. Furthermore is an insight of the accelerating-lambing system of production in Macedonian conditions.

4.1 The sheep sub-sector in Macedonia (current situation)

Macedonia has a long tradition in sheep breeding. Because of the specific semi-arid conditions and relief that is characterized by large and high mountain massifs, sheep was providing the basic animal products in the past.

It has always been done mainly by private producers. Nowadays, sheep farming is based on small family farms that possess sheep flocks between 200 and 300 sheep, but also there are some (not much) agricultural companies with more than 300 sheep heads (CR, 2003).

In proportion to the economic importance of its products (milk, meet, wool and manure) sheep breeding in Macedonia holds the second position in livestock production. In the last 15 years sheep production accounted around 13% of the total value of agricultural and livestock production (SS, 2009).

In accordance with the Breeding Strategy (2000) the basic purpose of breeding sheep in Macedonia is production of milk and lamb meat.
Almost the whole amount of milk production is processed into traditional white sheep cheese for domestic consumption.
Roughly half of the produced lamb meat goes for export. The main export markets are Italy and Greece, since this size of lamb (15-20 kilograms live weight i.e. 7-10 kilograms carcass weight) is usually required on these markets. The production of wool is not standardised, wool has low price and its market almost does not exist.

To give a brief orientation picture, in Table 1are presented the statistics for total number of slaughtered sheep in Macedonia in different categories (lambs, yearlings, ewes and rams) the average gross and the rendered weight of slaughtered livestock for the last few years.

Table 1. Slaughtered sheep in Macedonia (Source: Statistical yearbook 2009)

Year	2004	2005	2006	2007	2008	Average
Total number of slaughtered livestock (000 heads)						
Total	522	764	760	700	499	649,0
Lambs and yearlings	395	612	609	550	392	511,6
Ewes and rams	127	152	151	150	107	137,4
Average gross weight of slaughtered livestock (kg)						
Total	17	17	19	20	20	18,6
Lambs and yearlings	16	16	18	20	19	17,8
Ewes and rams	37	41	46	39	39	40,4
Rendered weight of slaughtered livestock (%)						
Total	65	53	53	50	50	54,2
Lambs and yearlings	53	54	53	51	50	52,2
Ewes and rams	48	42	44	44	46	44,8

The agricultural area in Macedonia is divided into eight statistical regions: Polog, Skopje, North-eastern, South-western, Vardar, Eastern, Pelagonia and South-eastern region (see fig.7).

Figure 7. Illustration of the Statistical regions in R. Macedonia SSO, 2008 (Source: Annual report for agriculture and rural development, MAWFE, 2009).

The obtained numbers in sheep breeding by statistical regions from the last census in agriculture in Macedonia in year 2007 are presented in Table 2.
From there it can be seen that sheep breeding is mostly practiced (concentrated) in the Eastern and Pelagonia regions. From the total number of 794 053 sheep and 522 824 ewes for production in Macedonia, 186 825 sheep and 131786 ewes are concentrated in the Eastern statistical region, and 139052 sheep and 94408 ewes are in the Pelagonia region (SSO, 1, 2010).

Table 2. Number of sheep and ewes in 2007 in Macedonia divided by statistical regions-in individual agricultural holdings and business entities (source: Census 2007, extraction of book1-table 14)

	Total heads	Ewes
Republic of Macedonia	794053	522824
Individual agricultural holdings	749341	490475
Business entities	44712	32349
Pelagonia Region	139052	94408
Individual agricultural holdings	129154	87083
Business entities	9898	7325
Vardar Region	67513	44941
Individual agricultural holdings	58543	39096

Business entities	8970	5845
Northeast Region	75983	52052
Individual agricultural holdings	75273	51682
Business entities	710	370
Southwest Region	109627	68139
Individual agricultural holdings	107744	66799
Business entities	1883	1340
Skopje Region	44914	29340
Individual agricultural holdings	43289	28085
Business entities	1625	1255
Southeast Region	71147	50549
Individual agricultural holdings	62501	45147
Business entities	8646	5402
Polog Region	98992	51609
Individual agricultural holdings	95910	48551
Business entities	3082	3058
East Region	**186825**	**131786**
Individual agricultural holdings	176927	124032
Business entities	9898	7754

4.1.1 The production systems and breeds

Sheep breeding in Macedonia is carried with a traditional *semi-nomadic* system of production, fully adapted to the natural resources and biological behaviour of the sheep (Dzabirski& Andonov, 1998).

The *low-input production system* that is practiced is a labour intensive characterized with a seasonal migration and extensive grazing. The production is based on local breeds, fully adapted to the consumption of natural resources. It arises in the highland regions in the country, mainly described as traditional production and for the most part of the cases it can be assumed as a kind of non-certified organic production (CR, 2003).

"In summer, from mid-May until the beginning of November, the sheep are grazed on the mountain pastures that cover around 50 % (542,000 ha) of the overall agricultural land. These are concentrated in the *mountains in **the Western*** (Sar Planina, Korab, Bistra and Karaorman Stogovo hills) and ***Eastern parts** of the country*. During winter, the herds are kept in the valleys on pastures (mainly the Vardar river planes) close to the farms.
In winter, when the requirements are highest (late pregnancy and first stage of lactation), ewes tend to be underfed depending on the farmer's capacity to supply forage and feed grains. No feed supplements are given. The sheep are bred for meat and milk production, resulting in relatively low yields for both products. Autumn is the mating season producing in lambs (2-4 kilograms at birth) by January-February. In two months (March-April) the lambs are weaned and fattened, especially for Easter. At 80 days, the lambs weigh 15-18 kilograms (carcass weight 8-10 kilograms). After weaning of the lambs, ewes are milked until mid-July (marketable milk yield 45-50 litres per ewe per lactation). Milking is usually invariably done by hand under often-poor hygiene conditions" (CR, 2003, 11).
But nowadays in sheep breeding, there are family farms which are practicing a medium-input production system, with lots of moderations in the production level and technologies used which results in better outcome.
Pramenka sheep breed belongs to the group of oldest domestic animals in Balkan Peninsula and in Southern Europe and the genomes of it are spread in these regions. But there are lots of

differences and variations in the types of breeding as well as the production traits (CWBPSBT, 2006).

The breed structure of the sheep population in Macedonia is consisted of three Pramenka indigenous types of breeds, Ovcepolian Sarplanian and Karakachanska and their crossbreeds with Merino and Avassi. From them Ovcepolian with around 60 % of total sheep population, and Sarplanian with close to 30% are used in production. Karakachanka sheep is rarely used nowadays.

Ovcepolian sheep: it is white animal with black spots on the head, present on 2/3 of the territory of Macedonia. It is spread in east and central part of the country. The average weight of ewes is between 35-45 kilograms. Rams are horny with live weight up to 45 kilograms. (CWBPSBT, 2006).

Sarplanian sheep: is fully in white colour, a bit lighter than Ovcepolian sheep. It is located in west mountainous area of the country, at Sar Planina (the name of the strain is linked to this mountain). The average weight of ewes is around 32,3kilograms. Rams are horny with live weight up to 44kilograms.

Karakachanska sheep: is characterised by black or black–brown colour, it is kept under nomad system. The name came from the Karakachans, Balkan nomad people. It is considered that due to their extremely conservative livestock traditions, Karakachans have saved the most primitive and pure domestic forms of animal breeding. It is very resistant and temperament animal, dynamic in mountain area, but rarely used in production (Kozarovski, 1998).

To improve the low yields of these domestic breeds, in the last 30 years a lot of breeds with high performances have been imported. The method of improvement for milk production was made with controlled crossing of local sheep breeds with Awassi rams. Moreover the lamb production is and should be continually improved with a terminal crossing with Merinolandshaf breed (CR, 2003).

Therefore nowadays it's rare to find the clean-blood breed of pramenka. Approximately 70% of the sheep population in Macedonia is consisted of a crossbreed from domestic Pramenka with the Merinolandschaf breed (pers.mess.Kozarovski, 2010).

Table 3. Production level and some characteristics of the local sheep breeds (per ewe) in Macedonia (CR,2003)

Trait	Level
Live weight	40-50 kg
Milk yield (commercial milk)	50-60 l
Birth weight	2 - 4 kg
Live weight of lambs at 90 days	15 - 18 kg
Wool yield	1,5 kg
Culled sheep	8-10kg

4.2 Accelerating lambing system (planned production of 3 lambs in 2 years)

One of the effective ways for enlargement of the revenue from lamb production enterprise is with increase of the number of lambs produced per ewe each year. This method is applicable and recommended (from experts) for Macedonian conditions of sheep breeding.

"With high-level management and production skills, it is possible to produce three lamb birthing cycles per ewe every two years. This technique is called accelerated lambing, which combines three periods of lamb production in 2 years into one enterprise. It also allows increased efficiency in use of labour, land, equipment and buildings"(www.psu.edu, 2010).

In the Table 4 below is presented the timetable of periods for breeding, lambing and marketing for the accelerating lambing system in Macedonian conditions (personal message Dzabirski and Porchu,2010).

Table 4. Timetable of periods for the accelerating lambing system in Macedonian conditions

Production method	Breeding months	Lambing months	Marketing months
Accelerated First lambing	October-March	March-April	May-July
Second lambing	February-July	July-August	September-November
Third lambing	July-November	November-December	February-April

The experts' recommend this system of breeding for a large flock of sheep (more than 500), because it is a more profitable solution.
According to the biological nature of the sheep breeds in Macedonia, their other recommendation is that one year half of the ewes in the flock should be used with the traditional way of production and the other half of the flock with the accelerating lambing system of production. The next year it goes the other way round, or they should change.

In terms of compiling the enterprise budgets, this system allows to increase the quantity of lamb meat, but at the same time decreased quantity of milk.

As it was composed in the enterprise budget, the lamb meat produced with the accelerating lambing system will be marketed three times in two years.
So except of the influence from increased quantity of produced lamb meat per year, there is also influence from the higher price which will be obtained in the period when the supply of lamb meat on the market is lower and the price riches a higher level. That was the reason for taking a weighted price for the lamb meat with this system of production.

5 The empirical study

A review of the data obtained directly from agricultural company and family farm with domestic Pramenka breed crossbred with Merinolandschaf in Bitola is presented in this chapter. Bitola is in the Pelagonia statistical region, as one of the biggest regions-after Eastern region for breeding sheep, located in the south-west part of Macedonia near the largest lakes. Also a desk research and consultations with experts are presented in this chapter. The attained outcome is a subject to further analysis and discussion (chapter 6).
The empirical part of the study can be divided in two phases. The main task was the development of the sheep enterprise budgets which was the first phase of the study. And the other part/phase was doing case studies in order to test the sheep budgets into a farm context using the business plan Agriwise Macedonia.

5.1 The content of sheep enterprise budgets for Agriwise Macedonia

For the fulfilment of the aim of this study, two types of sheep enterprise budgets were composed: enterprise budget for the traditional way of breeding sheep in Macedonia and another – enterprise budget for the potential way of breeding, applicable in a condition of an accelerating lambing system.
In the traditional way there are two options concerning how the produced milk will be marketed (as raw milk or processed and sold as sheep cheese).

In the traditional way of breeding one lamb is produced per ewe/year, and taking into consideration the background research, the live weight of the lamb in the budget is 18 kilograms. The recruitment percentage is estimated at 25% (approximately 5 years for use of ewes in production) with 5% for mortality included. The milk yield per ewe/year is 50 litres and 1,5 kilograms wool per sheep.
In the accelerated lambing system one ewe produces 1,5 lambs per year and approximately 25 litres milk, whereas the other output yields stay the same as in the traditional system.

Generally, the used prices in the budgets are the official prices from the State Statistical Office for 2009. However, there are also some adjustments which were made in consultation with the persons directly involved (farmers and experts in this sub-sector).

5.1.1 Incomes

The following figure 8 presents the incomes (described in this heading) extracted from the sheep enterprise budget.

			Quantity	Price	MKD	€			date
7									
8									
9		INCOMES							
10									
11	3312	Slaughter Lambs	kg	13,5	163,00	2 201	36		09-05-15
12	3313	Meat, slaughtered sheep	kg	10,0	60,00	600	10		09-06-30
13	3120	Milk sales	l	0,0	27,00	0	0		09-07-30
14	3314	Wool	kg	1,5	15,00	23	0		09-06-30
15	3311	Produced recruitment animal	no	0,25	6 100,00	1 525	25		09-06-01
16	3381	Subsidies	MKD	1,3	850,00	1 105	18		09-12-31
17	3310	Cheese sales	kg	14,0	248,80	3 483	57		09-10-30
18									
19		TOTAL INCOME				8 937	147		

Sheep 2010

Figure 8. Extraction of incomes from the sheep enterprise budget

Meat from Slaughter Lambs and sheep

After the reduction of quantity produced lamb meat for the recruitment section, it is taken that one ewe yearly will produce 13,5 kilograms of lamb meat in the traditional, and 22,5 kilograms in the accelerated system.

Given that the average weight of sheep in Macedonian conditions is between 40-50 kilograms and that the sheep is used in production for a period of five years from their first pregnancy, in the enterprise budgets it is taken that one ewe will produce approximately 10 kilos meat per year (culled sheep) in traditional conditions of breeding, and 15 kilos in the accelerated system.

To calculate the income from lamb meat in the enterprise budgets an average price of 163 MKD/kilo was considered, as an average from the presented monthly prices from SSO for livestock in the previous section (see Table 5). This price level was also confirmed by the farmers and consulted experts.

For the sheep meat from culled sheep a price of 60 MKD/kilo was taken. This prise does not correspond with the given average of 76,7 MKD/kilo (see Table 5) because it was formed in a consultation with farmers and experts which said that in practice the price of 76,7 MKD/kilo is too high and did not reach that amount in year 2009.

Table 5. Prices for livestock (live weight) on the livestock markets in 2009 per months in MKD/kilo (Source: Monthly reports for 2009 in SSO, 2010)

Year 2009	Lambs and yearlings	Sheep	Rams
January	170,9	80,0	108,2
February	166,3	76,6	111,1
March	155,6	77,2	109,6
April	152,0	77,1	108,5
May	154,6	79,6	109,2
June	151,9	77,8	108,8
July	155,6	74,8	108,0
August	175,6	75,9	105,0
September	173,0	75,7	104,7
October	167,8	76,7	102,9
November	163,8	74,7	102,8
December	176,4	73,8	103,2
Average	**163,6**	**76,7**	

Milk and cheese sales

In Macedonian conditions within the traditional breeding system sheep have a lactation period which lasts approximately 190 days. Given that the lambing period in the traditional way of breeding occurs in January to February and the lambs are weaned from March to April, ewes are milked until the middle of July (Dzabirski & Andonov, 1998).
For the milking period of 120-130 days, the average milk yield is around 50 litres.

In the accelerating system due to the production of 1,5 lambs per year, the milking period is shorter, so the obtained milk yield is taken as half the quantity of the traditional way of breeding or 25 litres per ewe/year.

In year 2008 (SY, 2009) raw milk reached an average buy-out price of 34 MKD/litre. However, in consultation with farmers and experts, for milk sale in 2009 an average price of 27 MKD is taken.

Because of the low buy-out price, raw milk is usually processed into sheep cheese.
To produce1 kilo of sheep cheese approximately 3,5 litres of raw milk are used. In the enterprise budget (traditional way of sheep breeding with production of cheese) it is taken that one ewe will produce 14 kilograms cheese per year.
The price of 248,8MKD per kilo of sheep cheese is taken as an average price from the monthly prices for Sheep cheese on green markets in the SSO pricelists for the period January-December 2009.

Wool

The wool yield from one sheep is around 1,5 kilograms. It is not standardised and has a low price.
The process of wool shearing is costly and tough labour-intensive task, and time consuming as well.
According to Galev & Arsovski (1990) one average worker can shear 20-25 sheep by hand or 80-120 with shearing machine per day.
The price of 15 MKD was taken in consultation with experts and from field as an average price in 2009 for 1 kilo of wool.

Produced recruitment animal

From conversation with farmers and verifying it with experts it can be stated that most of the sheep breeders in Macedonia are selecting and raising animals for recruitment from their own flock. So usually from the newborn lambs the best 25% are kept for further recruitment.
In discussion with the experts and farmers it was given that it is really rare to find good yearlings for breeding on the market, and if that occurs it will be with an estimated market price of 6100 MKD. So this price was taken as a relevant value to calculate the own produced lambs kept for recruitment of the flock (source: personal mess. farmers and experts 2010). Alternatively, an enterprise budget could be developed for recruitment ewe and in such case an internal price could be used.

Subsidies

The financial support for sheep production in Macedonia in the last five years was mainly in relation to maintaining and expanding the basic flock of sheep. It was also stimulated to

purchase male heads of breeding stock rams as reproductive (or original) of the breed Awassi and Wurttemberg (Merinolandshaf) for improving the production traits and yield of the domestic sheep breeds (www.slvesnik.com.mk, 2010).

In 2009 there were two types of financial support in sheep breeding. Financial support for marked sheep (for use of this support, the flock suppose to have a min. of 30 sheep from each category) with amount of 850 MKD per sheep, and the due date for application was 31 of May.
The other financial support (which is excluded from the budgets) was for buying rams (originals or reproductive) with high production characteristics (bought rams in the period January-September 2009 from registered breeding farms). This subsidy is funded with 50% of the buying price, but it cannot reach more than 15000 MKD per head-original or 5000MKD per head-reproductive (AFSARD, 1, 2010).

However, since 50% of the buying price is subsidies, meaning that the amount of subsidy will be the same as the amount of buying cost, this subsidy possibility is excluded from the budget. This kind of subsidy can be illustrated through an example:

Income	Quantity	Price	MKD
Subsidy (50% of buying price)	0,5	6100	3050
Separate costs1	0,5	6100	3050

Recruitment costs (50% of buying price, because half of the price is covered with the subsidies-in incomes).

5.1.2 Separate costs

The following figure 9 presents the separate costs (described in this heading) extracted from the sheep enterprise budget.

1		Separate costs								
2										
3	4311	Recruiting Animal	no	0,25	6 100,00	1 525	25			09-06-01
4	4151	Hay,alfalfa purchased	kg	238,9	5,00	1 195	20			08-09-01
5	94151	Hay, alfalfa produced on farm	kg	0	5,00	0	0			08-09-01
6	4154	Pasture	head	1,3	50,00	65	1			09-05-01
7	4331	Feed grain, barley purchased	kg	105	8,50	893	15			08-09-01
8	94133	Feed grain, barley produced on farm	kg	0	8,50	0	0			08-09-01
9	4331	Concentrates for lambs	kg	9,5	15,00	143	2			09-05-01
10	4138	Hormonal additives (pesarii)	unit	0	300,00	0	0			09-04-15
11	4138	Mineral supplement	kg	0,2	150,00	30	0,5			09-01-01
12	4138	Salt	kg	2	8,00	16	0,3			09-01-01
13	4370	Miscellaneous expenses	MKD	1	300,00	300	5			09-06-01
14	4370	Shepherd	h	11	98,18	1 080	18			09-09-01
15	4370	Costs for preparation of cheese	kg	0	15,75	0	0			09-07-01
16	4370	Additional direct labour for cheese	kg	0	75,60	0	0			09-07-01
17										
18		TOTAL separate costs 1				5 247	86			
19										
20	0000	Buildings, maintenance	MKD	3 050	1,5%	46	1			09-07-01
21	0000		MKD			0	0			
22						0	0			
23	0000	Interest Animal capital	MKD	4 250	7%	298	5			
24	10000	Interest in working capital	MKD	2 204	7%	154	3			
25										
26		TOTAL separate costs 2				5 745	94			
27										
28	0000	Buildings, deprec + interest	MKD	3 050	7,5%	229	4			
29	0000		MKD			0	0			
30						0	0			
31	20000	Labour, management	h	5,5	98,18	540	9			09-07-01
32										

Sheep 2010

Figure 9. Extraction of separate costs from the sheep enterprise budget

In the group of <u>separate costs 1</u> the direct costs, which are predominantly variable by character, are included in the sheep enterprise budget.

The cost for **recruiting anima**l is a cost for excluding the number of animal kept for replacement of the old/culled sheep. The price of 6100MKD (or approximately 100€) is price taken from field (company data and farmers) and in consultation with experts. The recruitment percentage of 25% includes 5% mortality rate.

The **feed consumption** in the budgets is taken as an ideally balanced combination of feed grain and hay with 250 oat units per ewe and small amount of supplements (source: experts). The quantity of 238,9kilograms per ewe hay (alfalfa) in the traditional and 244,6kilograms in the accelerating system also includes amount of feed for lambs and rams (given that in one year each ewe will produce 1 lamb in the traditional and 1,5 (or 3 in 2 years) lambs in the accelerated system, as well as the needs of 1 ram per 25 ewes).

In the 105kilograms of feed grain-barley per ewe 5 kilograms for ram (1 ram on 25 ewes) are also included. The reason for taking alfalfa and barley is because they are the most common growing livestock crops in Macedonia and used in sheep breeding.

In the budgets there are two options to choose, one as a certain amount that is purchased or produced on farm, or both.

The price of 5MKD per kilo alfalfa is taken as an official price from SSO and MAWFE. And 8,5MKD per kilo barley is price from the gathered data and in consultation with experts.

In the feed part in budgets are also included the concentrates for lambs with amount of 9,5kilograms per lamb (14,3kilograms in accelerating system for 1,5 lambs) and estimated market price of 15MKD per kilo. Concentrates are given to lambs to stimulate their growth and are bought by most farmers.

Sometimes other foodstuffs such as corn, oats and sugar beet can be only incidentally used like sheep food in Macedonia.

In the feed part is also included a **mineral supplement** with an approximate amount of 0,2kilograms per ewe and estimated market price of 150MKD per kilo, taken from the data survey. And a consumption of 2kilograms **salt** per ewe with estimated market price of 8MKD per kilo.

Since the grazing areas are owned by the government, the price of **pasture** is fixed and charges 50MKD per head. In the budgets except for the ewes is also taken a part for the other categories in the flock.

The cost for **hormonal additives** for provocation estrus: applied in the 5th month of the year is used *only in the accelerating lambing system*. The estimated market price of 300MKD per head is a price taken from the data survey and in consultation with experts.

The **miscellaneous costs** are consisted of costs for regular veterinary health checks and medicals, electricity, water supply, etc. The estimation of 300MKD per ewe was taken in consultation with experts and farmers.

The estimation of **shepherd** needs is 1 person per 200 heads in traditional way or 1 per 150 heads in accelerated lambing system. The amount of 98,18 MKD per hour which was formed in consultation with experts and relevant literature is attained from the sum of 2200 effective working hours per year divided on 12 months and multiplied with an average monthly wage for shepherd of 18 000MKD.

In the budget for traditional way of breeding with production of cheese, are taken **costs for preparation of cheese and additional direct labor for cheese**.
Given that for production of 1 kilo sheep cheese it is used approximately 3,5 litres of raw milk, one ewe will produce 14 kilograms cheese per year which means one tin-container per ewe. The sum of cost for one tin-container plus the other costs for preparation of cheese is 220 MKD. When this amount is divided on 14kilograms, the direct cost for preparation of 1 kilo cheese is 15,75 MKD (without milk cost and labor). The additional direct labor for cheese is 75,6 MKD per kilo cheese produced.

The group of separate costs 2 and 3 in the budgets are the predominantly fixed costs related to the sheep enterprise budget.
In the separate costs 2 is taken the **maintenance** rate of 1,5% for buildings. That refers to the building for sheep based on new construction costs with a sleeping area of $1m^2$ per ewe.
In this group of costs is also taken a cost for **animal and working capital** with a 7% rate.

In the separate costs 3 is calculated the **depreciation plus interest on buildings**. Annually 1.5% maintenance plus depreciation 4%, rate 3.5%. The value of sheep buildings and fittings (based on new construction costs) is 15000 euro x 61 = 915000MKD/300 heads = 3050 MKD per head.
The other management labor is estimated at 1 person per 400 sheep heads in traditional and 1 person per 300 heads in the accelerated system. The required amount in the budget of 5,5 hours per ewe in traditional and 7,3 hours in accelerated is taken as 2200 effective working hours per year divided to 400 or 300 heads. The amount of 98,18 MKD per hour which was formed in consultation with experts and relevant literature is attained from an average monthly wage of 18 000MKD multiplied with 12 months and divided with the sum of 2200 effective working hours per year.

5.1.3 Gross margin

The following figure 10 presents an extraction of the three levels of gross margins from the sheep enterprise budget.

Figure 10. Extraction of gross margins (GM 1, 2 and 3) from the sheep enterprise budget

Given that the separate costs in the enterprise budgets are divided into three levels (see heading 2.3), in order to check for the efficiency (the gross income or enterprise performance)

from the sheep enterprise budgets three levels of gross margins are calculated. The gross margins are calculated as the sum of total incomes from the budget minus the group of separate costs.

The Agriwise Macedonia model in the calculations automatically takes only the first level (GM1) of gross margin from the enterprise budgets. The real cost (depending on the planning situation) related to the other two levels of costs (separate costs 2 and 3) have to be added (manually) directly into the business plan.

Table 6. Gross margins (GM 1, 2 and 3) from the sheep enterprise budgets (in MKD)

	Traditional-milk	Traditional-cheese	Accelerated
Gross Margin 1	**1557**	**2411**	**2163**
Gross Margin 2	1059	1832	1636
Gross Margin 3	290	1063	690

5.1.4 Sensitivity analysis

The following figure 11 presents the sensitivity analysis matrix (described in this heading) extracted from the sheep enterprise budget.

Figure 11. Extraction of sensitivity matrix from the sheep enterprise budget

In the sheep budgets a sensitivity analysis or the impact of changes in performance level of the key factors on enterprise efficiency and profitability is included in the end. Since there is always some ambiguity about the future prices with investments, some changes in the yields and prices are used to form a gross margin sensitivity matrix.

Since in sheep enterprise there are few output products that bring income, in the budgets analysis lamb meat, milk and cheese are taken as sensitive, provided that the output and prices of the other products are fixed.

It is a sensitivity analysis on the gross margin (GM1) which gives the values of variation with 10% change in price and yield.

The break-even price or the output price needed to just cover all the costs at a given output level is also calculated, as well as the break-even yield necessary to cover all costs at given output price.

In Figure 11 the division by zero in relation to the GM1 Sensitivity analysis with regard to milk is due to the fact that no milk is sold with this system of production.

5.2 Case study of agricultural company with Agriwise Macedonia

The agricultural company which was visited for the aim of this study is one of the few large agricultural companies in Macedonia. Since this company is registered as a business entity it is obliged by law to keep farm records.
Besides sheep production, this company has other livestock and crop enterprises.
Though for the aim of this study concerns only the sheep enterprise, crop production used for feed was also analyzed.

5.2.1 The actual situation

Presently the company's sheep flock has 2200 ewes used in production. The present buildings for the flock are their own property and for their use is calculated annual maintenance rate of 1,5% and depreciation of 7,5%.

Almost the whole quantity of food consumed by sheep is internal - produced on farm, but there is also an amount of 70 kilograms/ewe feed grain that they are buying from other suppliers. The feedstuff bought internally from farm is calculated with an on-farm price of 3,44MKD/ kilo for alfalfa and 8,5MKD/kilo for barley. The 70 kilograms of feed grain are purchased with a price of 10MKD per kilo. With the extra 70kilograms of feed grain they are buying, there are no changes in the attained level of yield for meat and milk, which means that there is no need for this feed so it can be avoided.

The quantity of crops used like sheep feeds-barley and alfalfa are grown on the area of around 112 ha which is under leasing from the country, so they are paying lease for using it. For each hectare of land the lease paid is 3000MKD. These crops are irrigated and eligible for subsidies. The machinery used in the production of barley and alfalfa is property of the company, so except for the direct costs for lubricants, for their use is calculated 2,5% for maintenance and 10% for depreciation.
For the aim of the study were taken barley and alfalfa enterprise budgets constructed in 2008, within the Agriwise Macedonia model. There are no changes in norms and yield level from year 2008, only the prices were adjusted to 2009 level price.

There are also some other costs like 30 000MKD for transport, 700 000 for administration; 714 000MKD for consultancies (implies a broad perspective of costs, not only advisors). Except of these costs there is a big amount of 900 000MKD spent like miscellaneous costs for food, taxes and other costs.

The gross margin (GM1) of the sheep enterprise budget is 1230MKD per ewe.
The sensitivity matrix from the sheep budget gives a break-even yield of 13,2 kilograms meat per head with a break-even price of 159,4MKD per kilo. The break-even yield for milk is 48,9 liters per ewe with a break-even price of 26,4MKD per liter.

From the obtained results with the farm business model Agriwise Macedonia it can be seen that the agricultural company presently is not profitable and it's working with losses. Their income from capital and earned income, or in this case loss is 1 995 363 MKD.

The main reason for that are the large amount of miscellaneous as well as the consultancies costs paid, which can be reduced to a great extent and will influence on the outcomes of the company.

The grain feed which do not have influence on the yield can be excluded and that will alter with an increase in the gross margin of the sheep enterprise and the overall profitability of sheep production of the company.

The Profit and Lost statement of the actual situation is given in Appendix 4.

5.2.2 Recommended scenario with Accelerating Lambing system of production

If we set a planned/hypothetical scenario in the business model Agriwise Macedonia (with the same amount of available capacities) which will instead be with the accelerating lambing system of production this will be the outcome:

Using the present sheep flock of 2200 ewes in production which will produce 1,5 lamb per year. The same buildings for the flock plus new buildings for 500 heads more will be build and used with this system. The construction of buildings will cost 1 525 000MKD (or 3050MKD per head) and the amount will be taken as a debt with interest rate of 8%.
The quantity of crops used is a bit larger from the traditional system, so plus one hectare is used from the company's land (which is available). In that order the amount of money paid for leasing will increased for 3000MKD from the traditional system of production. It will be used the same machinery in the production which is property of the company, so except for the direct costs for lubricants, for their use is calculated 2,5% for maintenance and 10% for depreciation which is the same as in the actual (traditional) system of production.

The feedstuff bought internally from farm is calculated with an on-farm price of 3,44MKD/ kilo for alfalfa and 8,5MKD/kilo for barley, as in the actual (traditional) system of production. The 70 kilos of feed grain which were used with the traditional system will be excluded here, because they don't have any influence on the yield for meat and milk and there is no need for them. There will be change with the quantity of concentrates for lambs because more lambs per year will be produced with the accelerated system.

The big amount of 900 000MKD for miscellaneous costs is here decreased, and it is assumed that it can be decreased by half if good management and planning takes place. The same assumption is taken for consultancy costs.

From the obtained results with the business model Agriwise Macedonia it can be seen that the agricultural company with this scenario will be profitable and obtain income from capital and earned income with amount of 1 176 878 MKD.

The gross margin of the sheep enterprise with this system is 2578MKD per ewe, and with the traditional it was 1230MKD per ewe. This means that the gross margin with the accelerated system is double and the main reason for this is larger quantity of lamb meat produced with this system. Another reason for enlargement of the gross margin is the elimination of costs for the extra 70kilograms of feed grain which were used with the traditional system.

The Profit and Lost statement of the recommended scenario with accelerating lambing system is given in Appendix 5.

5.3 Case study of family farm with Agriwise Macedonia

The visited family farm is a commercial farm with sheep production only. It is not registered and therefore has no legal obligation to keep records for their work. They have only one shepherd and all the rest activities for the farm are done by the owner and his wife. Almost the whole quantity of the feed used is purchased except of the small part of hay which is produced on their own land. This farm was an interesting example because presently they have a combined production of the traditional (with sheep cheese) and the accelerating production system.

5.3.1 The actual condition

At the moment they have a flock consisted of 260 ewes. The buildings for the flock are their own property and for their use is calculated annual maintenance rate of 1,5% and depreciation of 7,5%.
The owners goal is to keep 300 000 MKD per year (or 25 000MKD monthly) as a personal withdrawal for their work.

The land (2 ha) with hay production is irrigated. They don't get subsidies for it. The machinery and transport used for hay production is contracted. They own one vehicle used for the needs of farm on which is calculated a maintenance rate of 2,5% and 10% for depreciation. Annually they drive 20 000 kilometres for the needs of the farm; therefore there is a cost of 140 000 MKD for transport. The amount of miscellaneous expenses is 10 000 MKD per year. There are also a start-up costs of 45 700 MKD which will be used for a small expansion (15m^2) of the buildings and they will take it as a debt with an interest rate of 8,5%.

Their expenses for the shepherd are 81,82 MKD/hour which is a bit lower than the average payment (98,18 MKD/hour) for shepherds in Macedonia.

Almost the whole quantity of food, except of the 2ha hay production consumed by sheep is purchased. The prices are 5 MKD/kilo for alfalfa and 8,5 MKD/kilo for barley. The small amount of alfalfa produced internally from farm is calculated with an on-farm price of 5 MKD/ kilo. In the traditional way of breeding 9,5 kilograms concentrates for lambs are used and in the accelerated 14,3kilos, bought with a price of 15 MKD/kilo.

Like pasture they rent land from other person and the cost for it is 72 MKD/head which is a bit more expensive than renting a government land with a fixed amount of 50MKD/head.

For the aim of the study was taken alfalfa enterprise budget constructed in 2008, within the Agriwise Macedonia model. There are no changes in norms and yield level from year 2008, only the prices were adjusted to 2009 level price.

More than half of the capacity or 160 ewes are used in the traditional (with sheep cheese) way of production which exceeds a gross margin of 2563 MKD per ewe. And the rest or 100 ewes are used with the accelerating lambing system where the gross margin is 2408 MKD per ewe.

The sensitivity matrix from the sheep budget with the traditional system gives a break-even yield of 11 kilograms meat per head with a break-even price of 132,6MKD per kilo. And in the accelerated system the break-even yield for meat is 18,4 kilograms/head with a break-even price of 144,5MKD/kilo. The break-even yield for milk in the accelerated system is 20,4 liters per ewe with a break-even price of 22 MKD per liter. In the traditional system the break-even yield for sheep cheese is 11,4 kilograms/head with a break-even price of 202,5 MKD/kilo.

From the obtained results with the business model Agriwise Macedonia it can be seen that the family farm is presently working profitable with an annual income from capital and earned income of 398 016 MKD (the Profit and Lost statement of the actual condition is given in Appendix 6).

In order to check for the performance of the three sheep enterprise budgets within family farm context and which combination will gave best outcome, or how can this owner increase his incomes it were set two planned/hypothetical scenarios of production. One where only the part of traditional-cheese is changed with traditional-milk (the accelerated system stays the same), and another where all flock is used with the traditional-cheese production only.

5.32 Two technologies of production- Accelerating lambing system and traditional milk

If we set a planned/hypothetical scenario in the business model Agriwise Macedonia (with the same amount of available capacities) where the accelerating system stays (as it is in the present-actual situation) and in the traditional way of breeding the produced milk is sold as raw, not processed into sheep cheese (as it is presently) this will be the outcome:

The flock stays the same or 100 ewes used for accelerated system of production and 160ewes with the traditional-milk production. Consequently on this the amount of feed stays the same so costs for feed are at the same level as in the actual condition, as well as the used capacities (buildings and vehicle).

With the accelerated system of production the gross margin stays the same as in the actual condition or 2408 MKD per ewe. And with the traditional-milk production the gross margin is 1709 MKD per ewe which if we compare with the traditional-cheese production (as it is in the actual condition) it is lower for 854 MKD. The reason for that is the low buy-out price of 27 MKD per litre raw milk.

From the obtained results with the Agriwise Macedonia model it can be seen that even do the gross margin of the traditional-milk is much lower comparing to actual condition, the family farm is still working profitable with an annual income from capital and earned income of 261 328 MKD, which is lower than the amount of 300 000 MKD they want to earn as personal withdrawal. Thus with this system of production they cannot fulfill their goal (the Profit and Lost statement of this scenario is given in Appendix 7).

5.3.3 Production with only one technology- traditional cheese

This scenario is set only with the traditional way of production where the produced milk will be processed and sold as sheep cheese.
The same capacities-buildings and vehicle are used here as well, which means the same amount of money spent for maintenance and depreciation costs.
In this case the whole flock or 260 ewes are used in a traditional-cheese production system. The amount of feed used is lower so there is a decrease for the costs for food. It is also excluded the amount of 300 MKD per ewe for hormonal additives, since this is needed only in the accelerated system of production.
The attained gross margin of the sheep (traditional-cheese) enterprise with this system is 2563 MKD per ewe. This is as a result from the price of the produced sheep cheese.

From the obtained results with the Agriwise Macedonia model it can be seen that with this production the gross margin reaches the highest level which means that the separate costs 1 are lower than in the accelerated system. With this production the owner will earn more

money, or 413 521 MKD as annual income from capital and earned income. Consequently, with this production after earning 300 000MKD as personal withdrawal the family farm will have 113 521 MKD remaining for interest on own and external capital (the Profit and Lost statement of this scenario is given in Appendix 8).

6 Analysis- Applicability of the enterprise budgets

This chapter aims to analyse the applicability of the enterprise budgets by answering the following questions:

- What are the outcomes-GM1, income, costs, and the break even yield and price in the created sheep enterprise budgets?
- What are the outcomes and suggestions for the agricultural company?
- What are the outcomes and suggestions for the family farm?

6.1 Enterprise budgets

6.1.1 Traditional-Milk

The Traditional-milk enterprise budget (see Appendix 1) concerns the traditional production system (for Macedonian conditions of sheep breeding) where there is one lamb per year and the production of milk is marketed-sold only as raw milk. The total incomes (including subsidies) comparing with the other budgets are the lowest with a total of 6804MKD per ewe. The main reason for this is the low price of milk-27MKD per litre.

The costs of production or the amount of separate costs 1 is 5247MKD per ewe, which provides the lowest gross margin of production from the three composed sheep budgets with *1557MKD (GM1)* per ewe.

The concept of cost of production can be a very functional when selling the products, because at any time the product can be sold for more than its cost of production and there will be a clear picture about how much profit was made (Kay R.D. et al., 2008).

The sensitivity analysis set with 10% variation in price and yield, with regard to lamb meat gave a break-even price of 151,6MKD per kilo, given that output and prices of the other products will stay fixed. Hence with this change of price the production of meat will be still profitable, but with lower profit or 11,4MKD per kilo meat. This can be obtained with a break-even yield of 12,6kilograms/head which is 0,9 kilograms less than the maximum yield, providing that the output and prices of the other products are fixed.
Moreover for milk the break-even price is 25,2MKD per litre with a break-even yield of 46,6litres/head (50 litres/head max yield) given that the output and prices of the other products are fixed.

6.1.2 Traditional-Cheese

The Traditional-cheese enterprise budget (see Appendix 2) is based on Traditional-milk enterprise budget with modification in the part of milk; in this budget the production of milk is processed and marketed-sold as traditional Macedonian white cheese. The total incomes (including subsidies) gave a total amount of 8937MKD per ewe, which is in fact the highest obtained income from all three composed sheep budgets. The main reason for this is the prise of sheep cheese estimated at a market price of 248,8MKD per kilo.

The direct costs of production or the amount of separate costs 1 is 6526MKD per ewe, which results in a gross margin of *2411 MKD (GM1)* per ewe.

As it was previously mentioned (see chapter 3) the break-even price is price of the given product needed to cover just all the costs at a given output level.

The sensitivity analysis for lamb meat with 10% variation in price and yield, gave a break-even price for lamb meat of 135,4MKD and a break-even yield of 11,2 kilograms/head, providing that the output and prices of the other products will stay fixed.

Moreover for cheese the break-even price is 205,1MKD per kilo with a break-even yield of 11,5kilograms per head, given that the output and prices of the other products are fixed.

Let assume that the price of sheep cheese will shrink for 10 % or instead of market price of 248,8 MKD will have 223,9 MKD per kilo, and the yield stays same or 14 kilograms per head. In this case the level of obtained incomes will be still the highest from all the three budgets with 8589 MKD per ewe. But the gross margin (GM1) with this scenario is 2063MKD per ewe which it's lower for 100 MKD per ewe than the gross margin of the accelerated system of production.

6.1.3 Accelerated system

The Accelerated system (see Appendix 3) or the system with accelerating lambing produces total income of 8211 MKD per ewe, because with this system are produced 1, 5 lamb per year (3 in 2 years). The price of 177MKD per kilo is taken as weighted price because this product will be marketed in three periods of two-year with different prices.

The direct costs of production or the amount of total separate costs 1 is 6048MKD per ewe, which results in a gross margin of *2163 MKD (GM1)* per ewe.

The sensitivity analysis for lamb meat with a variation of 10% in price and yield, gave a break-even price of 150,5MKD per kilo with a break-even yield of 19,1kilograms/head, providing that the output and prices of the other products will stay fixed.

Let assume that the price of lamb meat will raise for 10 % or instead of 177 MKD will have 194,7 MKD per kilo and the yield stays same or 22,5 kilograms per head. In this case the level of obtained incomes will be 8609 MKD per ewe. Therefore the gross margin (GM1) with this scenario is 2561MKD per ewe which is the highest gross margin of all presented systems of production.

Moreover for milk the break-even price is 21,8MKD per litre with a break-even yield of 20,2litres per head (25 litres/head max yield) given that the output and prices of the other products are fixed.

6.1.4 Comparative analysis of Gross Margin 1, Incomes and Costs

In the following Table 7 and figure 12 are presented the incomes, separate costs 1 and the gross margin 1 per ewe and compared further in the text in this heading.

Table 7. Incomes, Separate costs 1 and Gross Margin 1 in MKD per ewe

	Traditional-milk	Traditional-cheese	Accelerated
Incomes	6804	8937	8211
Separate Costs1	5247	6526	6048
Gross Margin 1(GM1)	**1557**	**2411**	**2163**
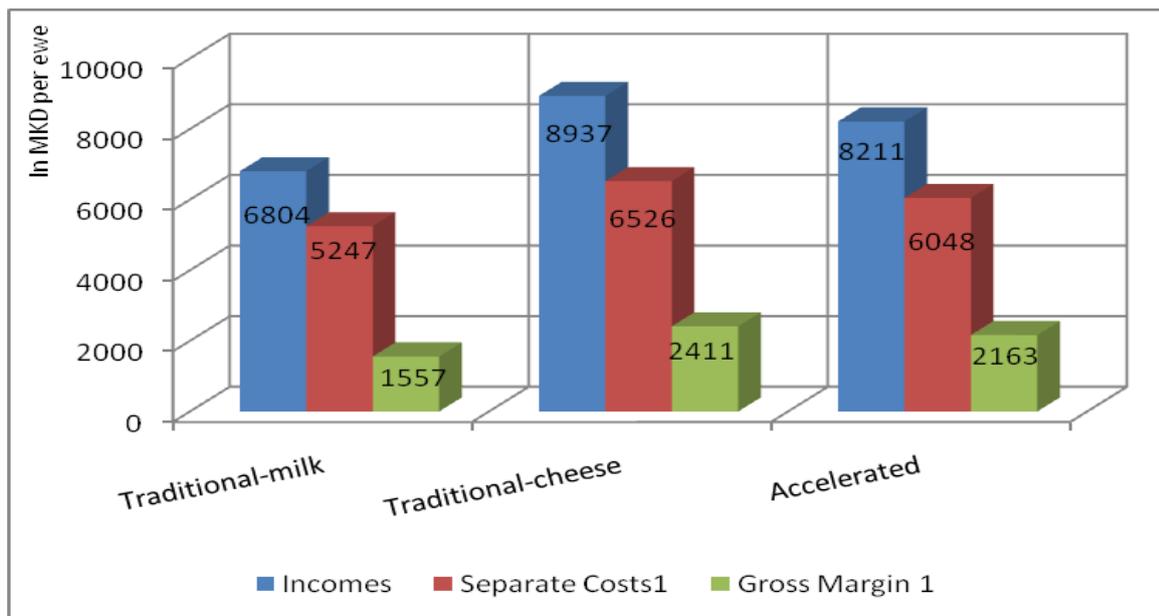
Figure 12. Incomes, Separate costs 1 and Gross Margin 1 in MKD per ewe

The presented Figure 11 shows that from the three composed sheep budgets in the study, the highest level of income with 8937 MKD per ewe is reached with the traditional-cheese production. As a main reason for that is the high market price of 248,8MKD kilo/sheep cheese which gives income of 3483 MKD per ewe, or incorporation with 44% of cheese incomes in the total structure of incomes in this sheep budget.

In contrary with this the traditional-milk production attains the lowest level of incomes or 6804 MKD per ewe. The main reason for that is the low buy-out price of 27MKD per litre which includes it with 24% incomes from milk into the total incomes, or 1350MKD per ewe.

In the accelerated system of production the high level of incomes with 8211 MKD per ewe is as a result of the enlargement of lamb meat production (1,5 per year). The meat is marketed three times in one year and for that reason is taken a weighted price of 177 MKD/kilo lamb meat. This is the main reason why more than half or 56 % of the total incomes are attained from lamb meat with 3983 MKD per ewe.

The level of separate costs 1 is highest in the traditional-cheese production system with 6526 MKD per ewe, which is as a result of the high cost for production of white sheep cheese.

But still from the three composed sheep budgets, best gross margin 1(GM1) gives the traditional-cheese production with 2411 MKD per ewe which is higher for 248 MKD per ewe then the Gross Margin 1 in accelerated system.

6.2 The agricultural company

From the obtained results with the model Agriwise Macedonia for their future work can be suggested incorporation of the accelerating lambing system (3/2) of production. With the present size of flock and available resources they have, this method is applicable for Macedonian conditions of sheep breeding and recommended from experts in this sub-sector.

It can be an effective way to enlarge the revenue from lamb meat production which will be attained with producing a greater amount of lamb meat marketed three times per year with a

higher weighted price than the market price of lamb produced with traditional system of production-1 lamb in 1 year.

With that practice the same amount of resources which they have available presently would be used to a full extend, except of the need of buildings for 500 heads more and additional shepherds. But still it would be profitable option, not like their actual choice which produces losses.

From the obtained results with the model Agriwise Macedonia presented in Table 8 can be seen that with the accelerating system they will not work with loss anymore, but the income from capital and earned income will be 1 176 997 MKD per year. And presently their income from capital or in fact their loss is -1 995 244 MKD.

As a result the net return on capital is changing positively, or from negative -10,8% goes to positive 7%. Subsequently from the adjusted balance sheet is taken that the net return on total capital from negative -8,4% goes to positive 7,22%.

Another positive item is the income from labor which presently is negative with -249 MKD, but with the accelerated system goes to positive 114MKD.

In the model the financial risk is measured with the lever formula (see chapter 3) which expresses the relation between solvency, capital profitability and debt interest rate. The ratio between debts and net worth is called lever.

Normally the owner's goal is to reach a higher profitability of net worth i.e. owner capital (R_E). So according to the lever formula a high profitability of total assets (R_T) is a good sign. And if R_T is greater than the interest rate of debts (R_S) the difference between them will provide the ratio between debts and the net worth. If more capital is borrowed at same interest rate (R_S) and invested in activities which will yield higher profitability (R_T) the profitability of the owners capital (R_E) will be higher. While if the profitability of total assets (R_T) is lower than the interest rate (R_S) there is a risk that the profitability of the net worth will become (R_E) negative. The level of this risk will be dependent on the level of debt in comparison with the net worth level. So when investing be certain that (R_T-R_S) of the investment is high enough (Öhlmer et al., 2000).

The solvency is changing from 87,15% to 79,79% and the reason for that change is the investment in new buildings which will be accomplished through a debt with 8% interest rate. It is good to have such a low lever percentage (20,21%) because of the high interest rates for debts in agriculture. That is why Macedonian farmers in general are inconvenient with taking credits and that is the reason why they don't go easily into big investments.

$$\text{Capital gain margin (CGM)} = \frac{(P + I)}{\text{Turnover}}$$

According to the du Pont system (see chapter 3) their actual Capital Gain Margin (CGM) can be improved with a cost rationalization, or decrease of the variable costs. Presently for example that can be done with excluding the costs for extra feed grain they are buying which do not have any positive influence on the yield. With this shrink of direct costs it will be increased the gross margin of the enterprise which leads to higher CGM.

Higher CTR or CGM is equal to a higher profitability of total assets (R_T) which is a good sign.

Table 8. Business ratios- agricultural company

	Business Ratios(agricultural company)	Actual situation	Accelerated system
	Profitability measurements		
1	Income before depreciations	-1 002 318	2 406 298
2	Income from capital and earned income	-1 995 244	1 176 997
3	Net return on capital (per cent) (Re)	-10,81%	7,02%
4	Net return on own capital (Re)	-1 995 244	1 176 997
5	Net return on total capital (Rt)	-1 777 644	1 516 597
6	Per cent net return on total capital (adjusted balance sheet) (Rt)	-8,40%	7,22%
7	Income from capital and earned income/labor year	-249	114
	Solvency measurements		
8	Solvency (E /Total assets)	87,15%	79,79%
9	Average interest on debt (Rs)	8%	8%
10	Total possible indebtedness at 5% interest rate	-35 553 000	30 332 000

6.3 The family farm

In this case study from the obtained results with the model Agriwise Macedonia the best choice would be to apply only the traditional-cheese production which gave the best results, even much better than the actual condition.
Except of the scenario with a combination of traditional-milk and accelerated systems of production, all the other outcomes give positive results.

From the presented results in Table-9 obtained with the model Agriwise Macedonia can be seen that with the traditional-cheese system of production the income from capital and earned income is the highest with 413 520 MKD per year. And presently their income from capital and earned income is 398 015 MKD per year. So if they decide to switch their production the earned profit will be greater for 15 505MKD per year, which means that the net return on capital will increase from 3,77% to 4,24%.

Only the combination of traditional-milk and accelerated systems of production produce a negative net return on capital -1,60% which is mainly because of the low buy-out price of raw sheep milk.

Another positive item is the income from labor which presently is 443 MKD and with the traditional-cheese system goes to 519MKD.

The solvency is more less the same in all three situations, around 98% which is high, but as it was mentioned previously because of the high interest rates for debts in agriculture the Macedonian farmers in general are not comfortable with taking credits which is the reason why they don't go easily into big investments.

$$\textbf{Capital Turnover Rate (CTR)} = \frac{\text{Turnover}}{\text{Total Assets}}$$

According to the du Pont system (see chapter 3) their actual Capital Turnover Rate (CTR) can be improved with a capital rationalization. Presently for example that can be done with decrease of the cash and customer credits which will tide less capital in the business. With that shift the CTR will be increased. Higher CTR or CGM is equal to a higher profitability of total assets (R_T) which is a good sign.

Table 9. Business Ratios- family farm

	Business Ratios(family farm)	**Actual condition**	**Milk+ accelerated**	**Traditional cheese**
	Profitability measurements			
1	Income before depreciations	495 246	358 558	510 751
2	Income from capital and earned income	398 015	261 327	413 520
3	Net return on capital (per cent)	3,77%	-1,60%	4,24%
4	Net return on own capital	98 015	-38 672	113 520
5	Net return on total capital	101 840	-34 847	117 345
6	Per cent net return on total capital (adjusted balance sheet)	3,85%	-1,42%	4,31%
7	Income from capital and earned income/labor year	443	291	519
	Solvency measurements			
8	Solvency	98,30%	98,17%	98,35%
9	Average interest on debt	8,50%	8,50%	8,50%
10	Total possible indebtedness at 5% interest rate	2 037 000	-697 000	2 347 000

Table 9. Business Ratios- family farm

7 Conclusions

The last chapter of this study seeks to address the research questions illustrated in chapter one of the study. The broad aim of this research is the development of sheep enterprise budgets created on the best production traits for Macedonian conditions of breeding and integrate them into the farm business plan model Agriwise Macedonia.

The applicability was tested in farm context with planning the cases with the Agriwise Macedonia farm planning model.

The aim of creating sheep budgets in farm business planning context is *to improve the overall strategic and operational planning on farm and support a justified decision in approaching more profitable results*, as well as to provide a good basis for additional expansion of the business.

The main objectives of this study are as follows:

- Define the production traits for sheep breeding on best practice for Macedonian conditions (milk and meat production);
- Compose sheep enterprise budgets with the traditional technology (current) of production(traditional milk and traditional cheese);
- Compose sheep enterprise budgets with the accelerating lambing system – the planned (potential) technology of production;
- Analyze the average profitability with current technology and the technology of planned (potential) accelerating lambing system of production;
- Conclude about the applicability of the developed enterprise budgets in the Agriwise Macedonia model

Production traits

The sheep enterprise budgets were created on the best production practice for Macedonian conditions of breeding-domestic breed Pramenka crossbred Merinolandschaf breed, in accordance with desk research and consultation with experts in this sub-sector.

For creating the sheep enterprise budgets were taken the following production traits:
- Production of one lamb per ewe/year with live weight of 18 kilograms per lamb;
- Recruitment percentage 25% (5% for mortality);
- One ewe will be used in production for five years (recruitment percentage of 25%) so 10 kilograms of meat from slaughtered culled sheep per year;
- 50 litres of commercial milk per ewe/year;
- 1,5 kilograms wool per ewe/year.

These production traits were taken for creating the traditional (milk and cheese) sheep enterprise. There is a difference only with marketing the milk which in the traditional cheese system is processed into 14 kilograms of traditional white cheese per ewe/year.

Since the accelerating lambing system of production is with the same sheep breed, the production traits are the same, except of the enlargement of lamb meat because of the production of 1,5 lambs per year (3 lambs in 2 years) and 25 litres of commercial milk per ewe/year.

These budgets are historical budgets created with current prices from 2009. But because prices can and do change rapidly, most likely for calculation of 2010 or such other period prices should be adjusted to the expected prices for that period.

Average Profitability of the sheep budgets

From the composed sheep enterprise budgets with 2009 price level it can be concluded that the traditional-cheese enterprise budget was the most profitable with 8937 MKD total income (including subsidies) per ewe and after covering 6526 MKD for direct-separate costs 1, the obtained gross margin1 is 2411 MKD per ewe (see Appendixes 1-3). The main reason for this outcome is the high market price of the cheese. The income from white sheep cheese is 3483 MKD per ewe, or represents 44% of the total incomes.

The traditional-milk production system provides the lowest outcome.The total income (including subsidies) is 6804MKD per ewe and after the direct-separate costs 1 of 5247 per ewe the gross margin 1 per is 1557 MKD per ewe. The main reason for this low outcome is the low buy-out price of 27 MKD per litre milk.

The potential accelerated system or the system with accelerating lambing produces total income (including subsidies) of 8211 MKD per ewe. After covering the costs of production or the direct-separate costs1 of 6048 MKD per ewe it is obtained a gross margin 1 of 2163 MKD per ewe.

From the case studies within the farm planning model Agriwise Macedonia

From the obtained results can be concluded/suggested that for the family farms with a herd size between 200-500 ewes for production like most profitable is the traditional system with production of traditional white sheep cheese.
These results can be even better with improvement of the conditions for cheese preparation and taking some initiatives for making a brand of traditional Macedonian white cheese. As a result it can be exported out of the country with a higher than the present price which means it will accumulate more profit.

The traditional way of breeding with selling the milk as raw without processing it is not that profitable and that does not depend on the size of the flock.

The accelerating lambing system with production of three lambs in 2 years from the obtained results can be recommended for a herd size above 500 ewes for production. The reason is more efficient use of the available resources, as it was tested in the case study with the agricultural company. And also confirmed with the family farm where with 260 ewes in total, it was more profitable to use only the traditional-cheese system of production.

With support of constant farm record keeping and the farm business model Agriwise Macedonia, these sheep budgets can be of great value for the strategic and operational planning in sheep farms in Macedonia. That will contribute for justified future decisions in achievement of more profitable results, which will lead/contribute to a modern and competitive farm management tool in the Macedonian agriculture.

Bibliography

Literature and Publications

ARARD, *Annual report for agriculture and rural development for 2008*, 2009, Ministry of Agriculture, Forestry and Water Economy

Cook C.W & Hunsaker P.L., 2001, *Management and organizational Behavior* (3rd.edition) McGraw-Hill, New York, pp.58

CR, *Country report on the state of the animal genetic resources in R. of Macedonia*, 2003, Ministry of Agriculture, Forestry and Water Economy

CWBPSBT, *Catalogue of West Balkan Pramenka Sheep Breed Types*, 2006, Faculty of Agricultural Sciences and Food (ISBN 9989-845-23-9) pp.55-61

Debertin David L., 1986. *Agricultural Production Economics,* University of Kentucky, Macmillan Publishing (ISBN 0-02-328060- 3), pp. 300

Drummond H. Evan & Goodwin W. John. 2004. *Agricultural Economics*, (2nd edition) Prentice Hall, New Jersey, (ISBN 0-13-047452-5) pp. 19-20

Drury Colin.2006.*Cost and Management Accounting*, (6th edition) Thomson, London, (ISBN 978-1-84480-349-1) pp.28; 37-38;

Dzabirski V.& Andonov S. 1998. *Sheep and goat husbandry in the Former Yugoslav Republic of Macedonia*, Proceedings of the workshop Sheep and goat production in Central and Eastern European Countries held in Budapest, Hungary,Rome 1998

Galev T & Arsovski B.1990. *Организација на земјоделските стопанства и организација на сточарското производство* (*Organisation of the agricultural holdings and organization of livestock production)*, Skopje, Macedonia, pp.338-375

Jones R. Gareth & George M.Jennifer. 2008. *Contemporary Management,* McGraw-Hill Irwin,   (ISBN 978-608-4522-00-3) pp.5

Kozarovski N.1998, *Овчарство и козарство, Битола* (ISBN 9989-870-01-2) pp.93-111

Malcom B. Makeham J. & Wright V. 2005.*The Farming Game. Agricultural Management and Marketing* (2nd edition), Cambridge University Press. pp.62

Martinovska-Stojceska Aleksandra. 2007. *Трошоците и калкулациите во функција на сметководствентиот и информациониот систем на индивидуалните земјоделски стопанства,* PhD dissertation.

Milanov Metodi & Martinovska-Stojceska Aleksandra, 2002. *Trosoci i kalkulaci (Costs and Calculations),* Skopje, Macedonia, pp.194-201;

Milanov Metodi & Martinovska-Stojceska Aleksandra, 2009. *Taksacii vo zemjodelstvoto,* Skopje, Macedonia, (ISBN 978-9989-845-38-3) pp.;

NBPL, *National breeding program for livestock in Republic of Macedonia*, 2000, Ministry of Agriculture, Forestry and Water Economy

NPRAD, *National Programme for Rural and Agricultural Development* 2007-2013, Ministry of Agriculture, Forestry and Water Economy

Öhlmer, Göransson & Lunneryd, 2000. Business Management - *with Applications to Farms and Other Businesses,* Uppsala, Sweden, pp.141-153; 203-231;

Öhlmer B, Karlsson T and Martinovska-Stojceska A, 2010, *Enterprise Budgeting and Farm Business Planning to Evaluate an Organizational Change*, Handout.

Öhlmer B, Martinovska-Stojceska A, Dimitrievski D. & Karlsson T. 2010, *Agriwise Macedonia- A new decision support system for farm management in contrast to current practices,* Faculty for Agricultural Sciences and Food, Institute of Agricultural Economics; Swedish Agricultural University (SLU) Department of Economics.

Olson Kent D., 2004. Farm Management - *Principles and Strategies*, Iowa (ISBN 0-8138-0418-3) pp.6-9; 16; 85; 251-273;

SS, Ažderski, J., Belkovski, N., Georgiev, N., Dimitrievski, D., Gjorgjevski, G., Gjoševski, D. *et al.*, 2009. Block B Sector analysis of Macedonian agriculture, In: D. Dimitrievski and T. Ericson (eds.), *Final draft, Sector study – Macedonian agriculture in the period 1995-2007,* Skopje: University Ss Cyril and Methodius – Skopje (UKIM) and Uppsala: Swedish University of Agricultural Sciences (SLU)

SY, *Statistical yearbook,* 2009.State Statistical Office (SSO), Skopje, Macedonia

Robbins P.Stephen & DeCenzo A.David. 2001. *Fundamentals of management* (3rd.edition), Prentice-Hall,Inc., N.Jersey (ISBN 0-13-017601-X)

Kay D. Ronald, Edwards M. William & Duffy A.Patricia., 2008. *Farm Management* – Sixt Edition, McGraw-Hill Education, (ISBN 978-007-125953-8) pp.3- 6; 111-115; 159-171; 293-308;

Turner Jonathan & Taylor Martin. 1998. *Applied Farm Management* (2nd.ed.), Blackwell Publishing, (ISBN 0-632-03603-6) pp.1; 30-48;

Internet

AGRIWISE SWEDEN, http://www.agriwise.org/
  1. English translation in Öhlmer Bo, Karlsson Thord and Aleksandra Martinovska-Stojceska, 2010, *Enterprise Budgeting and Farm Business Planning to Evaluate an Organizational Change*, Swedish Agricultural University (SLU) Department of Economics and Faculty for Agricultural Sciences and Food, Institute of Agricultural Economics;

AFSARD, Agency for financial support of Agriculture and Rural Development, http://www.ipardpa.gov.mk/Root/default_eng.asp

1. Календар за поднесување на барања за Програма за финансиска поддршка во земјоделството за 2009 година, 2010-04-29
   http://www.ipardpa.gov.mk/Root/mak/default_mak.asp

MAFWE, Ministry of Agriculture, Forestry and Water Economy, www.mzsv.gov.mk

1. *Development of the Agricultural and Food Sector*, 2009-12-20
   http://www.mzsv.gov.mk/index.php?option=com_content&task=view&lang=en&id=18

MCE, Maryland Cooperative Extension, http://extension.umd.edu/local/
1. *Enterprise Budgets in Farm Management*, 2010-02-14
http://extension.umd.edu/publications/PDFs/fs545.pdf

Official Gazette of the Republic of Macedonia, http://www.slvesnik.com.mk/default-en.asp
1. Subsidies in Agriculture-Sheep production, 2010-04-03
http://80.77.144.32/2008/54A7B4DF2DCBEF4FA90DCB1A849F7481.pdf

Oklahoma Cooperative Extension Service, http://www.oces.okstate.edu/
1. Using Enterprise Budgets in Farm Financial Planning, 2010-02-15
http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Rendition-5993/AGEC-243web.pdf

Penn State, Agriculture Alternatives (cooperative extension),
http://agalternatives.aers.psu.edu/

1. *Off-season and Accelerated Lamb Production,* 2010-03-13
   http://agalternatives.aers.psu.edu/Publications/lamb.pdf

SSO, State Statistical Office, http://www.stat.gov.mk/english/glavna_eng.asp
1. Census in Agriculture, Book 1-Table 14, 2010-03-13
   http://www.stat.gov.mk/PopisNaZemjodelstvoto2007/pressDokumenti/BookI.pdf

Personal messages

Dzabirski Vladimir, PhD
Professor, Faculty for agricultural sciences and food, Skopje, R.Macedonia
Personal meeting 2010-02-09; 2010-03-09; 2010-04-16; 2010-05-07

Kozarovski Nikola, PhD
Professor (retired), University "Ss.Kliment Ohridski"-Bitola, R.Macedonia
Personal meeting 2010-04-27

Porchu Kocho, MSc
Assistant, Faculty for agricultural sciences and food, Skopje, R.Macedonia
Personal meeting 2010-02-09; 2010-03-09;2010-04-16; 2010-05-07; 2010-05-17

Trajkovski Petar, BSc
Advisor, National Extension Agency (NEA), Bitola, R. Macedonia
Personal meeting 2010-04-27
E-mail 2010-04-28

Appendixes

Appendix 1: Enterprise budget calculation for the traditional-milk production system

SLUs/FASF

Area Estimates 2009 (region Bitola)

Version 1; Release Date 2010-05-05   **Domestic Pramenka crossbred with Merinolandschaf breed**

Subsidy scheme   eligible

Self-recruitment

Aproximately 230-day grazing period

Average weight per ewe 40-50 kg   **Indicate production system**   traditional-milk ▼

Milk fat 6-7%

Incomes and separate costs

per ewe and year

			Number of lambs	1			
			Liveweight, kg per lamb	18			
			Recruitment Percentage	25%			
			Wool, kg per sheep	1,5			Transactions date
		Quantity	Price		MKD	€	
	INCOMES						
3312	Slaughter Lambs	kg	13,5	163	2 201	36	09-05-15
3313	Meat, slaughtered sheep	kg	10,0	60	600	10	09-06-30
3120	Milk sales	l	50,0	27	1 350	22	09-07-30
3314	Wool	kg	1,5	15	23	0	09-06-30

3311	Produced recruitment animal	no	0,25	6 100	1 525	25	09-06-01
3381	Subsidies	MKD	1,3	850	1 105	18	09-12-31
3310	Cheese sales	kg	0,0	248,80	0	0	09-10-30
	TOTAL INCOME				6 804	112	
	Separate costs						
4311	Recruiting Animal	no	0,25	6 100	1 525	25	09-06-01
4151	Hay,alfalfa purchased	kg	238,9	5	1 195	20	08-09-01
94151	Hay, alfalfa produced on farm	kg	0	5	0	0	08-09-01
4154	Pasture	head	1,3	50	65	1	09-05-01
4331	Feed grain, barley purchased	kg	105	8,5	893	15	08-09-01
94133	Feed grain, barley produced on farm	kg	0	8,5	0	0	08-09-01
4331	Concentrates for lambs	kg	9,5	15	143	2	09-05-01
4138	Hormonal additives (pesarii)	unit	0	300	0	0	09-04-15
4138	Mineral supplement	kg	0,2	150	30	0,5	09-01-01
4138	Salt	kg	2	8	16	0,3	09-01-01
4370	Miscellaneous expenses	MKD	1	300	300	5	09-06-01
4370	Shepherd	h	11	98,18	1 080	18	09-09-01
4370	Costs for preparation of cheese	kg	0	15,75	0	0	09-07-01
4370	Additional direct labour for cheese	kg	0	75,60	0	0	09-07-01
	TOTAL separate costs 1				5 247	86	
0000	Buildings, maintenance	MKD	3 050	1,5%	46	1	09-07-01
0000		MKD			0	0	
					0	0	
0000	Interest Animal capital	MKD	4 250	7%	298	5	
10000	Interest in working capital	MKD	2 204	7%	154	3	
	TOTAL separate costs 2				5 745	94	
0000	Buildings, deprec + interest	MKD	3 050	7,5%	229	4	
0000		MKD			0	0	
					0	0	
20000	Labour, management	h	5,5	98,18	540	9	09-07-01

	Separate costs 3, TOTAL			6 514	107	

Gross margin

30000	GM 1 = Income - Separate costs 1	MKD		1 557	
	GM 2 = Income - Separate costs 2	MKD		1 059	
	GM 3 = Income - Separate costs 3	MKD		290	

GM1 SENSITIVITY ANALYSIS, with regard to lamb meat

	Yield (kg/head):	Price (MKD/kg):			*Break-even price:*
		146,7	**163,0**	179,3	*151,6*
Yield variation:	12,2	1 146	1 345	1 543	
10%	**13,5**	1 336	**1 557**	1 777	*Break-even yield:*
Price variation:	14,9	1 542	1 785	2 028	*12,6*
10%					

GM1 SENSITIVITY ANALYSIS, with regard to milk

	Yield (kg/head):	Price (MKD/kg):			*Break-even price:*
		24,3	**27,0**	29,7	*25,2*
Yield variation:	45,0	1 301	1 422	1 544	
10%	**50,0**	1 422	**1 557**	1 692	*Break-even yield:*
Price variation:	55,0	1 544	1 692	1 841	*46,6*
10%					

GM1 SENSITIVITY ANALYSIS, with regard to cheese

	Yield (kg/head):	Price (MKD/kg):			*Break-even price:*
		223,9	**248,8**	273,7	*#DIV/0!*
Yield variation:	0,0	1 557	1 557	1 557	
10%	**0,0**	1 557	**1 557**	1 557	*Break-even yield:*
Price variation:	0,0	1 557	1 557	1 557	*-*
10%					

Appendix 2: Enterprise budget calculation for the traditional-cheese production system

SLUs/FASF

Area Estimates 2009 (region Bitola)

Version 1; Release Date 2010-05-05

Domestic Pramenka crossbred with Merinolandschaf breed

agriwise
МАКЕДОНИЈА

Subsidy scheme   eligible

Self-recruitment

Aproximately 230-day grazing period

Average weight per ewe 40-50 kg

Milk fat 6-7%

Indicate production system   traditional-cheese ▼

			Number of lambs	1			
Incomes and separate costs			Liveweight, kg per lamb	18			
			Recruitment				
per ewe and year			Percentage	25%			
			Wool, kg per sheep	1,5			Transactions date
		Quantity	Price		MKD	€	
	INCOMES						
3312	Slaughter Lambs	kg	13,5	163	2 201	36	09-05-15
3313	Meat, slaughtered sheep	kg	10,0	60	600	10	09-06-30
3120	Milk sales	l	0,0	27	0	0	09-07-30
3314	Wool	kg	1,5	15	23	0	09-06-30
3311	Produced recruitment animal	no	0,25	6 100	1 525	25	09-06-01
3381	Subsidies	MKD	1,3	850	1 105	18	09-12-31
3310	Cheese sales	kg	14,0	248,80	3 483	57	09-10-30

	TOTAL INCOME				8 937	147	
	Separate costs						
4311	Recruiting Animal	no	0,25	6 100	1 525	25	09-06-01
4151	Hay,alfalfa purchased	kg	238,9	5	1 195	20	08-09-01
94151	Hay, alfalfa produced on farm	kg	0	5	0	0	08-09-01
4154	Pasture	head	1,3	50	65	1	09-05-01
4331	Feed grain, barley purchased	kg	105	8,5	893	15	08-09-01
94133	Feed grain, barley produced on farm	kg	0	8,5	0	0	08-09-01
4331	Concentrates for lambs	kg	9,5	15	143	2	09-05-01
4138	Hormonal additives (pesarii)	unit	0	300	0	0	09-04-15
4138	Mineral supplement	kg	0,2	150	30	0,5	09-01-01
4138	Salt	kg	2	8	16	0,3	09-01-01
4370	Miscellaneous expenses	MKD	1	300	300	5	09-06-01
4370	Shepherd	h	11	98,18	1 080	18	09-09-01
4370	Costs for preparation of cheese	kg	14	15,75	221	4	09-07-01
4370	Additional direct labour for cheese	kg	14	75,60	1 058	17	09-07-01
	TOTAL separate costs 1				6 526	107	
0000	Buildings, maintenance	MKD	3 050	1,5%	46	1	09-07-01
0000		MKD			0	0	
					0	0	
0000	Interest Animal capital	MKD	4 250	7%	298	5	
10000	Interest in working capital	MKD	3 362	7%	235	4	
	TOTAL separate costs 2				7 105	116	
0000	Buildings, deprec + interest	MKD	3 050	7,5%	229	4	
0000		MKD			0	0	
					0	0	
20000	Labour, management	h	5,5	98,18	540	9	09-07-01
	Separate costs 3, TOTAL				7 874	129	
	Gross margin						

30000	GM 1 = Income - Separate costs 1	MKD		2 411
	GM 2 = Income - Separate costs 2	MKD		1 832
	GM 3 = Income - Separate costs 3	MKD		1 063

GM1 SENSITIVITY ANALYSIS, with regard to lamb meat

	Yield (kg/head):	Price (MKD/kg):			Break-even price:
		146,7	**163,0**	179,3	**135,4**
Yield variation:	12,2	2 000	2 199	2 397	
10%	**13,5**	2 190	**2 411**	2 631	Break-even yield:
Price variation:	14,9	2 396	2 639	2 882	**11,2**
10%					

GM1 SENSITIVITY ANALYSIS, with regard to milk

	Yield (kg/head):	Price (MKD/kg):			Break-even price:
		24,3	**27,0**	29,7	**#DIV/0!**
Yield variation:	0,0	2 411	2 411	2 411	
10%	**0,0**	2 411	**2 411**	2 411	Break-even yield:
Price variation:	0,0	2 411	2 411	2 411	**-**
10%					

GM1 SENSITIVITY ANALYSIS, with regard to cheese

	Yield (kg/head):	Price (MKD/kg):			Break-even price:
		223,9	**248,8**	273,7	**205,1**
Yield variation:	12,6	1 749	2 063	2 377	
10%	**14,0**	2 063	**2 411**	2 760	Break-even yield:
Price variation:	15,4	2 376	2 760	3 143	**11,5**
10%					

Appendix 3: Enterprise budget calculation for the accelerated production system

МАКЕДОНИЈА

SLUs/FASF

Area Estimates 2009 (region Bitola)

Version 1; Release Date 2010-05-05 | **Domestic Pramenka crossbred with Merinolandschaf breed**

Subsidy scheme eligible

Self-recruitment

Aproximately 230-day grazing period

Average weight per ewe 40-50 kg

Milk fat 6-7%

Indicate production system accelerated ▼

					Number of lambs	1,5			
					Liveweight, kg per lamb	18			
Incomes and separate costs					Recruitment Percentage	25%			
per ewe and year					Wool, kg per sheep	1,5			Transactions date
		Quantity	Price			MKD	€		
	INCOMES								
3312	Slaughter Lambs	kg	22,5		177	3 983	65		09-05-15
3313	Meat, slaughtered sheep	kg	15,0		60	900	15		09-06-30
3120	Milk sales	l	25,0		27	675	11		09-07-30
3314	Wool	kg	1,5		15	23	0		09-06-30
3311	Produced recruitment animal	no	0,25		6 100	1 525	25		09-06-01
3381	Subsidies	MKD	1,3		850	1 105	18		09-12-31
3310	Cheese sales	kg	0,0		248,80	0	0		09-10-30

	TOTAL INCOME				8 211	135	
	Separate costs						
4311	Recruiting Animal	no	0,25	6 100	1 525	25	09-06-01
4151	Hay,alfalfa purchased	kg	244,6	5	1 223	20	08-09-01
94151	Hay, alfalfa produced on farm	kg	0	5	0	0	08-09-01
4154	Pasture	head	1,3	50	65	1	09-05-01
4331	Feed grain, barley purchased	kg	105	8,5	893	15	08-09-01
94133	Feed grain, barley produced on farm	kg	0	8,5	0	0	08-09-01
4331	Concentrates for lambs	kg	14,3	15	215	4	09-05-01
4138	Hormonal additives (pesarii)	unit	1	300	300	5	09-04-15
4138	Mineral supplement	kg	0,2	150	30	0,5	09-01-01
4138	Salt	kg	3	8	24	0,4	09-01-01
4370	Miscellaneous expenses	MKD	1	300	300	5	09-06-01
4370	Shepherd	h	15	98,18	1 473	24	09-09-01
4370	Costs for preparation of cheese	kg	0	15,75	0	0	09-07-01
4370	Additional direct labour for cheese	kg	0	75,60	0	0	09-07-01
	TOTAL separate costs 1				6 048	99	
0000	Buildings, maintenance	MKD	3 050	1,5%	46	1	09-07-01
0000		MKD			0	0	
					0	0	
0000	Interest Animal capital	MKD	4 850	7%	340	6	
10000	Interest in working capital	MKD	2 011	7%	141	2	
	TOTAL separate costs 2				6 575	108	
0000	Buildings, deprec + interest	MKD	3 050	7,5%	229	4	
0000		MKD			0	0	
					0	0	
20000	Labour, management	h	7,3	98,18	717	12	09-07-01
	Separate costs 3, TOTAL				7 521	123	

Gross margin

30000	GM 1 = Income - Separate costs 1	MKD	2 163
	GM 2 = Income - Separate costs 2	MKD	1 636
	GM 3 = Income - Separate costs 3	MKD	690

GM1 SENSITIVITY ANALYSIS, with regard to lamb meat

	Yield (kg/head):	Price (MKD/kg):			Break-even price:
		159,3	**177,0**	194,7	**150,5**
Yield variation:	20,3	1 414	1 773	2 132	
10%	**22,5**	1 764	**2 163**	2 561	**Break-even yield:**
Price variation:	24,8	2 131	2 570	3 009	**19,1**
10%					

GM1 SENSITIVITY ANALYSIS, with regard to milk

	Yield (kg/head):	Price (MKD/kg):			Break-even price:
		24,3	**27,0**	29,7	**21,8**
Yield variation:	22,5	2 035	2 096	2 156	
10%	**25,0**	2 096	**2 163**	2 231	**Break-even yield:**
Price variation:	27,5	2 156	2 231	2 305	**20,2**
10%					

GM1 SENSITIVITY ANALYSIS, with regard to cheese

	Yield (kg/head):	Price (MKD/kg):			Break-even price:
		223,9	**248,8**	273,7	**#DIV/0!**
Yield variation:	0,0	2 163	2 163	2 163	
10%	**0,0**	2 163	**2 163**	2 163	**Break-even yield:**
Price variation:	0,0	2 163	2 163	2 163	**-**
10%					

Domestic Pramenka crossbred with Merinolandschaf breed - Price level 2009th

Note that the calculation of 2010 or such other period prices should be adjusted to the expected price for that period. The used prices in this budget are the current prices from 2009 or at the time listed below for the product, but prices can and do change rapidly.

The transaction date for sales of meat and milk is taken as average in the mid-year.

Lamb: the average price of **163 MKD** per kg was taken from the monthly prices for Lambs and yearlings (Prices of live animals on livestock markets) in the SSO pricelists for the period January-December 2009.

In the accelerated system: the price is higher, since the meat is sold in three different periods **(177MKD/kg)**

Sheep: the price of **60MKD** per kg for slaughtered sheep was taken as an average price mostly common paid in practice in this region (source: farmers- company data and advisors).

Milk: the price of **27 MKD** per liter was taken directly from farmers on field, like a buy-out price for the family farms in 2009. Some farmers can get a higher price, up to 33 MKD/l (source: farmers- company data and advisors).

Wool: **15 MKD** - price of sorted, unwashed wool in 2009 (source: farmers and advisors; company data)

Produced recruitment animal: estimated market price at **6100 MKD** (source: farmers, experts and advisors)

Subsidies: financial support for marked sheep (for use of this support, the flock suppose to have a minimum of 30 sheep from each category) + 30% for yearlings and rams. The amount of support is **850 MKD per head** (source: MAWFE).

Additional financial support for buying rams (originals or reproductors) with high production characteristics (bought rams in the period January-September 2009 from registered breeding farms) is also available. However, since 50% of the buying price is subsidiesed, meaning that the amount of subsidy will be the same as the amount of buying cost, this subsidy possibility is excluded from the budget.

Cheese: Average price of **248,8MKD** is taken from the monthly prices for Sheep cheese on green markets in the SSO pricelists for the period January-December 2009.

Recruitment: The quantity of lamb meat has been reduced by the recruitment percentage. The recruitment percentage of 25% includes 5% mortality.

Feed: a normative combination of 250 oat units per ewe (220kg alfalfa+100kg barley per ewe/year).The amount in the budget includes also feed for lambs and rams, given that in one year each ewe will produce 1 lamb in the traditional and 1,5 lambs in the accelerated system, and the need of 1 ram per 25 ewes.

Alfalfa: estimated market price at **5 MKD/kg** (source: farmers and advisors; official price from SSO and MAWFE)

Barley: estimated market price at **8,5 MKD/kg** (source: farmers and advisors; official price from SSO and MAWFE)

Concentrates for lambs: estimated market price at 15 MKD per kg (source: farmers, experts and advisors)

Mineral supplement: the approximate amount of 0,2kg per head is taken directly from the farmers.

Estimated market price at **150 MKD/kg** (source: farmers and advisors)

Salt: estimated market price at 8 MKD/kg (source: farmers and advisors)

Pasture: Since the grazing areas are owned by the government, the price of pasture is fixed and charges **50 MKD** per head (source: MAWFE, farmers and advisors)

Hormonal additive for provocation estrus: applied in the 5th month of the year (only in the accelerated lambing system). Estimated market price of **300MKD** per head (source: farmers, advisors and experts)

Miscellaneous expenses: includes veterinary, medical, health, electricity, water supply, etc. The estimation of 300MKD per ewe was taken in consultation with experts and farmers.

Shepherd: **98,18MKD per hour** -an average monthly payment of 18000MKD*12months/2200 effective working hours per year (source: relevant literature in consultation with experts).

Costs for preparation of cheese: 1 kg of cheese - **15,75 MKD** direct costs (without milk cost and labour) i.e. 220 MKD per tin-container of 14 kg per ewe(source: farmers-company data)

Buildings: Refers to the building for sheep, based on new construction costs. Sleeping area of 1 m2 per ewe. Annual: 1.5% maintenance, depreciation 4%, rate 3.5%.value of sheep buildings and fittings 15000 euro x 61 = 915000/300 heads = 3050 MKD per head

Work: Shepherd needs estimation: 1 person per 200 sheep (in traditional) or 1 per 150 sheep (in accelerated).

Other management labour estimated at 1 person per 400 sheep.

Sensitivity analysis: Since in sheep enterprise there are few output products that bring income, in this analysis lamb meat, milk and cheese are taken as sensitive, provided that the output and prices of the other products are fixed.

Appendix 4: Agricultural company-Profit and Lost statement of the actual situation

Profit and loss statement

Income		
3015	Spring barley	125 860,00
3061	Hay	2 939,71
3080	Subsidies, crop production	543 700,00
3120	Milkproduction - livestock sales	2 970 000,00
3311	Breeding animals, sheep and goats	3 355 000,00
3312	Lamb, slaugheter	4 841 100,00
3313	Breeding animals, culled	1 320 000,00
3314	Hides and wool	49 500,00
3381	Subsidies, ewes	2 431 000,00
Total income		15 639 099,71
Costs		
4010	Seeds	477 960,00
4021	N	278 400,00
4023	NPK	641 550,00
4043	Pesticides	257 480,00
4065	Spraying	583 200,00
4066	Harvesting	553 000,00
4081		2 013,76
4138	Mineral supplement	101 200,00
4154	Grazing	143 000,00
4311	Purchases, sheep and goats	3 355 000,00
4331	Feeds, sheep and goats	1 853 500,00
4370		3 036 000,00
5110	Tenancy	331 800,00
5170		100 650,00
5360	Fuel, oil	381 364,00
5380	Water	442 400,00
5520	Repair/maintenance of movables	68 019,00
5700	Freight	305 586,00
6100	Office equipment and printing materials	700 000,00
6500		714 000,00
6900	Sundry	900 000,00
7010	Wages	1 415 414,00
Total costs		16 641 536,76
Income before depreciation		-1 002 437,05

Depreciation (yearly reinvestment and amortisation requirements)

7810	Depreciations, intangible assets	0,00
7814	Depreciations, production rights	0,00
7821	Depreciations, buildings	503 250,00
7832	Depreciations, machinery/inventory	272 076,00
7833	Depreciations, building fittings	0,00
7835	Depreciations, land improvements	0,00
Total depreciation (yearly reinvestment and amortisation requirements)		775 326,00
Income after depreciation		-1 777 763,05
Financial income and costs		
8310	Interest earned, liquid assets	0,00
8410	Interest paid, long term debts	217 600,00
Total financial incomes and costs		-217 600,00
Income from capital and earned income		-1 995 363,05

Appendix 5: Agricultural company-Profit and Lost statement of the recommended scenario with accelerating lambing system

Profit and loss statement

Income		
3015	Spring barley	125 860,00
3080	Subsidies, crop production	547 942,00
3120	Milkproduction - livestock sales	1 485 000,00
3311	Breeding animals, sheep and goats	3 355 000,00
3312	Lamb, slaugheter	8 761 500,00
3313	Breeding animals, culled	1 980 000,00
3314	Hides and wool	49 500,00
3381	Subsidies, ewes	2 431 000,00
Total income		18 735 802,00
Costs		
4010	Seeds	481 596,00
4021	N	278 400,00
4023	NPK	647 913,00
4043	Pesticides	260 873,59
4065	Spraying	592 896,00
4066	Harvesting	559 060,00
4081		2 013,76
4138	Mineral supplement	778 800,00
4154	Grazing	143 000,00
4311	Purchases, sheep and goats	3 355 000,00
4331	Feeds, sheep and goats	470 250,00
4370		3 828 000,00
5110	Tenancy	335 430,00
5170		100 650,00
5360	Fuel, oil	382 988,08
5380	Water	447 248,00
5520	Repair/maintenance of movables	68 019,00
5700	Freight	281 646,00
6100	Office equipment and printing materials	700 000,00
6500		350 000,00
6900	Sundry	450 000,00
7010	Wages	1 815 839,13
Total costs		16 329 622,56
Income before depreciation		2 406 179,44

Depreciation (yearly reinvestment and amortisation requirements)	
7810 Depreciations, intangible assets	114 375,00
7814 Depreciations, production rights	0,00
7821 Depreciations, buildings	503 250,00
7832 Depreciations, machinery/inventory	272 076,00
7833 Depreciations, building fittings	0,00
7835 Depreciations, land improvements	0,00
Total depreciation (yearly reinvestment and amortisation requirements)	889 701,00
Income after depreciation	1 516 478,44
Financial income and costs	
8310 Interest earned, liquid assets	0,00
8410 Interest paid, long term debts	339 600,00
Total financial incomes and costs	-339 600,00
Income from capital and earned income	1 176 878,44

Appendix 6: Family farm -Profit and Lost statement of the actual condition

Profit and loss statement

Income		
3120	Milkproduction - livestock sales	67 500,00
3310	Sheep and goats	557 312,00
3311	Breeding animals, sheep and goats	396 500,00
3312	Lamb, slaugheter	750 330,00
3313	Breeding animals, culled	186 000,00
3314	Hides and wool	5 850,00
3381	Subsidies, ewes	287 300,00
Total income		2 250 792,00
Costs		
4010	Seeds	6 000,00
4023	NPK	10 500,00
4043	Pesticides	5 600,00
4061	Soil cultivation	3 000,00
4062		1 500,00
4065	Spraying	11 560,00
4066	Harvesting	6 000,00
4138	Mineral supplement	42 760,00
4151	Hay	247 420,00
4154	Grazing	24 336,00
4311	Purchases, sheep and goats	396 500,00
4331	Feeds, sheep and goats	276 225,00
4370		546 624,00
5170		11 895,00
5380	Water	8 000,00
5520	Repair/maintenance of movables	7 625,00
5700	Freight	140 000,00
6900	Sundry	10 000,00
Total costs		1 755 545,00
Income before depreciation		495 247,00
Depreciation (yearly reinvestment and amortisation requirements)		
7810	Depreciations, intangible assets	3 431,00
7814	Depreciations, production rights	0,00
7821	Depreciations, buildings	59 475,00
7832	Depreciations, machinery/inventory	30 500,00
7833	Depreciations, building fittings	0,00

7835	Depreciations, land improvements	0,00
Total depreciation (yearly reinvestment and amortisation requirements)		93 406,00
Income after depreciation		401 841,00
Financial income and costs		
8310	Interest earned, liquid assets	0,00
8410	Interest paid, long term debts	3 825,00
Total financial incomes and costs		-3 825,00
Income from capital and earned income		398 016,00

Appendix 7: Family farm -Profit and Lost statement of the accelerated + traditional-milk systems of production

Profit and loss statement

Income		
3120	Milkproduction - livestock sales	283 500,00
3311	Breeding animals, sheep and goats	396 500,00
3312	Lamb, slaugheter	750 330,00
3313	Breeding animals, culled	186 000,00
3314	Hides and wool	5 850,00
3381	Subsidies, ewes	287 300,00
Total income		1 909 480,00
Costs		
4010	Seeds	6 000,00
4023	NPK	10 500,00
4043	Pesticides	5 600,00
4061	Soil cultivation	3 000,00
4062		1 500,00
4065	Spraying	11 560,00
4066	Harvesting	6 000,00
4138	Mineral supplement	42 760,00
4151	Hay	247 420,00
4154	Grazing	24 336,00
4311	Purchases, sheep and goats	396 500,00
4331	Feeds, sheep and goats	276 225,00
4370		342 000,00
5170		11 895,00
5380	Water	8 000,00
5520	Repair/maintenance of movables	7 625,00
5700	Freight	140 000,00
6900	Sundry	10 000,00
Total costs		1 550 921,00
Income before depreciation		358 559,00
Depreciation (yearly reinvestment and amortisation requirements)		
7810	Depreciations, intangible assets	3 431,00
7814	Depreciations, production rights	0,00
7821	Depreciations, buildings	59 475,00
7832	Depreciations, machinery/inventory	30 500,00
7833	Depreciations, building fittings	0,00

7835	Depreciations, land improvements	0,00
Total depreciation (yearly reinvestment and amortisation requirements)		93 406,00
Income after depreciation		265 153,00
Financial income and costs		
8310	Interest earned, liquid assets	0,00
8410	Interest paid, long term debts	3 825,00
Total financial incomes and costs		-3 825,00
Income from capital and earned income		261 328,00

Appendix 8: Family farm -Profit and Lost statement- production with only one technology- traditional-cheese

Profit and loss statement

Income		
3310	Sheep and goats	905 632,00
3311	Breeding animals, sheep and goats	396 500,00
3312	Lamb, slaugheter	572 130,00
3313	Breeding animals, culled	156 000,00
3314	Hides and wool	5 850,00
3381	Subsidies, ewes	287 300,00
Total income		**2 323 412,00**
Costs		
4010	Seeds	6 000,00
4023	NPK	10 500,00
4043	Pesticides	5 600,00
4061	Soil cultivation	3 000,00
4062		1 500,00
4065	Spraying	11 560,00
4066	Harvesting	6 000,00
4138	Mineral supplement	11 960,00
4151	Hay	244 570,31
4154	Grazing	24 336,00
4311	Purchases, sheep and goats	396 500,00
4331	Feeds, sheep and goats	269 100,00
4370		644 514,00
5170		11 895,00
5380	Water	8 000,00
5520	Repair/maintenance of movables	7 625,00
5700	Freight	140 000,00
6900	Sundry	10 000,00
Total costs		**1 812 660,31**
Income before depreciation		**510 751,69**
Depreciation (yearly reinvestment and amortisation requirements)		
7810	Depreciations, intangible assets	3 431,00
7814	Depreciations, production rights	0,00
7821	Depreciations, buildings	59 475,00
7832	Depreciations, machinery/inventory	30 500,00
7833	Depreciations, building fittings	0,00

7835	Depreciations, land improvements	0,00
Total depreciation (yearly reinvestment and amortisation requirements)		93 406,00
Income after depreciation		417 345,69
Financial income and costs		
8310	Interest earned, liquid assets	0,00
8410	Interest paid, long term debts	3 825,00
Total financial incomes and costs		-3 825,00
Income from capital and earned income		413 520,69