Evaluation of Biological Assets: Problems and Solutions

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The chief production elements of an agricultural enterprise are its biological assets and the choice and practical application of the evaluation methods, as the assets directly affect many aspects: decision making of economic character by the financial statement user, indicators of financial operation analysis, inter-comparison of sector enterprises, assessment of the company value and taxes on its economic activity, and statistical data of the agricultural sector. The authors have used the discounted cash flow (DCF) as an alternative method and a model of system dynamics. Such a system dynamics method has not been used for assessment of biological assets so far. In the operating process, the company acquires or loses possession of the resources. It is vital to analyze the resources to see whether they comply with the concept of the assets and the terms of recognition. It is necessary for the same company as well as for external users of financial statements to get true information about the business and the value of money. Biological assets may be recognized in the company’s accounting only when it is predictable that future benefits associated with these assets will flow into the enterprise. It is also important that the fair value or the cost can be measured reliably.

Keywords: biological assets, assessment methods, fair value

Introduction

Agriculture provides the population with livelihood. It promotes commercial activities and sustainable employment in rural areas, thus improving the living quality and retaining density of rural population.

The value of agriculture in the total net domestic product (NDP) of Latvia keeps a growing trend, and in 2010, it was 1.7%. Grain crops and milk are definitely the most significant agricultural products of the Latvian agriculture (Ministry of Agriculture of Republic of Latvia, 2011).

Comprehensive, objective, and timely information is vitally important for a successful development of the national economy in market conditions. The main sources of information including agriculture are accounting statement data of the companies (Jesemēika, 2010a).

A coordinated approach to make financial statements and their contents for all or at least many countries is a precondition for successful operation of multinational companies. Incomparability of the statement data does not promote optimal managerial decision making. As the accounting standards regulating determination and measurement of profits are the results of accumulated experience of accountants, regulating institutions, business people, and other practitioners, they depict only a “temporary balance” based partially on the knowledge and experience of practitioners and partially upon a compromise between traditionally different...
interests and viewpoints regarding the evaluation methods. Although the accountants have gradually narrowed the range of measurement principles, alternatives still exist and cannot be excluded in the nearest future. Thus, unification of accounting means diminishing differences in approaches to accounting methods of economic operations, events, and conditions (Ivanova, n.d.).

An important tool for accounting in agricultural activities is the aid “biological assets” which distinguish accounting in agriculture from other sectors of economy (Ore, 2010). Biological assets are animals or plants that a company grows to obtain agricultural produce for sale or as additional biological assets (Supreme Council of Republic of Latvia, 1992a). The accounting for biological assets is closely related to the inventory of the agricultural produce from the plants and animals at the moment of its harvesting (Kalniņa, 2006).

The problems in the assessment of biological assets are related to the fact that agriculture depends on agro-climatic conditions and territorial remoteness of an enterprise from the sales markets to a great extent. This is especially acute when estimating long-term biological assets, the fair value of which has been created in a longer period of time in changeable market conditions. The value of perennial plants and food-producing animals considerably changes, depending on their location zones. This is closely related to the changes in risk degree and production costs. It should be noted that with time, the initial plant and animal values differ from the values of similar physically young and more productive biological assets (Jesemčika, 2010b).

However, very little attention is paid to issues of biological assets stocktaking in accounting in Latvia. Neither is there a normative legislation to determine the order of accounting biological assets, nor any research exploring the problems of biological asset accounting has been carried out (Jesemčika, 2010a).

The choice and application of evaluation methods of biological assets and products obtained from them give different values in such a financial statement elements such as balance asset groups (“biological assets”, “stocks”), liabilities group (“undivided profit of the reporting year”), as well as profit and loss account of production cost and stock value correction items. This in turn leads to different results in analyses of financial statements, company value, and tax account from economic activities and consequently leaves an impact on operational and strategic managerial decisions and statistical data of the state agricultural sector.

The aim of this research is to systematise and analyse accounting methods of biological assets on the basis of the International Accounting Standard (IAS) 41—“Agriculture” and normative documentation of the Republic of Latvia (LR) and to draw conclusions on the existing theories and international experience with an aim of developing an alternative for evaluation methods of biological assets of agricultural enterprises.

**Research Methods**

This research is based upon an issue: When analysing the regulatory basis and expert cognitions on current evaluation methods of biological assets, their basic principles, and application, it is evident that they have certain shortcomings.

During this research, the authors have carried out an analysis of IAS 41, LR laws and regulations, previous researches and expert publications, and international experience regarding assessment aspects of biological assets from January 1, 2000 until December 2011. As a result of this research, the authors have summarised theoretical findings in assessment methods of biological assets as stated in current normative legislation, advantages, and disadvantages of their application which proves that none of the methods is ideal. On the basis of these conclusions, the authors have summarised and analysed evaluation methods of biological assets and have developed an alternative method of evaluation.
Results and Discussion

To prepare a high-quality financial statement, an agricultural company has to take into account two important conditions: classification of funds and their evaluation. This would provide comparability of separate financial indicators of agricultural companies within the sector. This would also provide clear and truthful information on the property of a company and the results of its economic activities. This is primarily necessary for every owner (manager) for an evaluation of one’s financial situation, control, further planning of economic activities and decision makings.

Assessment is the process of estimation in monetary units, where elements of financial statements are recognised and assessed on the enterprise balance sheet and in the profit and loss account. For this purpose, it is necessary to select a specific method (Jesemčīka, 2010b). Differences in determination of profit depend on the applied asset value evaluation and deleting methods on the approach to profit account and to what extent tax legislation affects stocktaking (Ivanova, n.d.).

Generally accepted are assessment methods which are based on the followings: transfer prices which are calculated considering inflation and object profitability; purchase value; substitution value; sales value; actual or regulatory cost which is adjusted considering the inflation index, and discounted value (Jesemčīka, 2010b).

The existing normative documents and accounting standards of Latvia do not explicitly contain provisions for the evaluation of objects, records, etc. and application of accounting principles in agricultural companies. In contrary to Estonia and Lithuania, Latvia has not developed or approved the accounting standards for biological assets (Ore, 2010).

The authors have analyzed requirements of regulatory framework for evaluation of biological assets of Latvian agricultural enterprises. The summary of the analysis is given in Table 1.

<table>
<thead>
<tr>
<th>Agricultural enterprise form</th>
<th>Normative document</th>
<th>Requirement in biological asset assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial company, which provides an annual report in compliance with IAS according to financial instrument market law</td>
<td>IAS 41 requirements</td>
<td>Yes</td>
</tr>
<tr>
<td>The single-entry accounting system may be used by sole traders, individual enterprises, farms and fisheries whose turnover from economic activities in the previous tax year does not exceed LVL 200,000 and other natural persons carrying out an economic activity</td>
<td>Cabinet regulation No. 188 “on procedures allowing the single-entry accounting system to be used by sole traders, individual enterprises, farms and fisheries, and other natural persons carrying out an economic activity”</td>
<td>No</td>
</tr>
<tr>
<td>Other agricultural companies</td>
<td>Cabinet regulation No. 488 “enforcement of law on annual reports”</td>
<td>No</td>
</tr>
</tbody>
</table>

Table 1
Regulatory Framework for Evaluation of Biological Assets of Latvian Agricultural Enterprises

Note. Source: The authors’ own study based on the LR laws and regulations.

If an agricultural enterprise is a commercial company which provides an annual report in compliance with IAS (Supreme Council of Republic of Latvia, 1992a) according to financial instrument market law, then such a company should follow the requirements of IAS 41 regarding evaluation of biological assets and initial

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evaluation of agricultural produce at the moment of harvesting. If agricultural produce is manufactured by individual enterprises, farms and fisheries whose turnover from economic activities in the previous tax year does not exceed Latvia Lats (LVL) 200,000 and who use a single-entry accounting system, sole traders, and other natural persons carrying out an economic activity (Supreme Council of Republic of Latvia, 1992b), they reflect revenues and expenditures and fill in declarations and forms according to Cabinet regulation No. 188 from March 20, 2007 “on procedures allowing the single-entry accounting system to be used by sole traders, individual enterprises, farms and fisheries, and other natural persons carrying out an economic activity”\(^2\) (Cabinet of Ministers, 2007a) and Cabinet regulation No. 301 from May 8, 2008, “regulations on sole traders’ financial statements”\(^3\) (Cabinet of Ministers, 2007b). This normative legislation does not stipulate nor define requirements regarding the evaluation of biological assets. The accountants of other agricultural enterprises have to follow the requirements of the law on annual reports which have certain inconsistency and contradictions in comparison with IAS 41.

Current assessment methods of biological assets for LR-registered agricultural enterprises are historical cost accounting (HCA) and fair value accounting (FVA).

IAS 41 requires that biological assets shall be measured at their fair value less estimated sales costs from the initial recognition of the biological assets to the point of harvest, except cases when fair value cannot be measured reliably on the initial recognition.

The fair value of an asset is based on its present location and condition. As a result, for example, the fair value of cattle at a farm is the price for the cattle in the relevant market less the transport and other costs of getting the cattle to that market (International Accounting Standards Committee, 2000).

Latvian agricultural companies subjected to the annual accounts law may evaluate their biological assets by the cost account method or apply the fair value method. The annual accounts law defines the cost account method in Section 26, Part 3, as follows: “Cost account is calculated by summing the cost of raw materials and other expenses directly related to manufacturing the respective object. Indirect expenses may also be included in the cost account if they refer to this period of time”\(^4\) (Supreme Council of Republic of Latvia, 1992a). Table 2 shows a comparison of historical cost and fair value by different criteria.

Table 2

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Historical cost</th>
<th>Fair value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value calculation at the moment of recognition and each date of balance</td>
<td>Purchase cost = purchase price + associated costs or production cost = direct costs + indirect costs</td>
<td>Fair value = market value – calculated sales costs</td>
</tr>
<tr>
<td>Depreciation</td>
<td>Is assessed</td>
<td>Is not assessed</td>
</tr>
<tr>
<td>Value changes</td>
<td>In case of value decrease according to the lowest value or in case of value increase according to the highest value</td>
<td>Included in the profit and loss account</td>
</tr>
<tr>
<td>Additional provisions</td>
<td>None</td>
<td>Active market exists or it is possible to state the fair value by other recognised methods</td>
</tr>
</tbody>
</table>

Note. Source: The authors’ own study based on the IAS 41 and the annual accounts law.

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Table 3 gives a comparison of requirements of IAS 41 and annual accounts regarding evaluation of biological assets and evaluation of agricultural produce obtained from biological assets at the point of harvest. According to the stock assessment procedures stated in Sections 30, 31, and 32 of the annual accounts law, the production obtained in the harvesting process or animal breeding or cessation of animal’s life process should be registered as production cost. This is different from IAS 41’s “Agriculture” guidelines which provide an assessment of the agricultural produce obtained in the harvesting process to be assessed at their fair value, which in further records is treated as cost of production (Kalniņa, 2006).

<table>
<thead>
<tr>
<th>Object</th>
<th>IAS 41</th>
<th>Annual accounts law</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological assets</td>
<td>Fair value</td>
<td>Fair value or historical cost</td>
</tr>
<tr>
<td>Agricultural produce obtained from biological assets at the point of harvest</td>
<td>Fair value, which in further accounting is equalized to production costs</td>
<td>Historical cost</td>
</tr>
</tbody>
</table>

Note. Source: The authors’ own study based on the IAS 41 and the annual accounts law.

Regarding IAS 41 (approved by the IAS Council in December 2000), Elad maintained that it “marked both a radical departure from the traditional accounting for biological assets and an early test of fair value accounting” (Elad, 2004; as cited in Fisher, Mortensen, & Webber, 2010, p. 1). “There is an intense debate on the convenience of moving from historical cost account to the fair value principle” (Argilés, Garcia-Blandon, & Monllau, 2011, p. 87).

“Economic realities and current developments have made many scholars wonder about whether corporate reporting should be led by markets or by regulators. Meanwhile, the concept of fair value and its implementation takes the authors even further into an area where management’s input and disclosure takes on added significance” (Bonaci & Strouhal, 2011, p. 14).

International scientists’ cognitions on the advantages and disadvantages of the fair value method have been accumulated by Fisher et al. (2010), Argilés et al. (2011), and Bonaci and Strouhal (2011).

While analysing statements of theoreticians, the authors have identified the following disadvantages of the HCA model: (1) “It fails to adequately account for the unique reproductive and natural transformational nature of biological assets” (Argilés & Slof, 2001; as cited in Fisher et al., 2010, p. 2); (2) It “ignores the realities of rapidly-changing market values of farming assets” (Cowan, 1972; as cited in Fisher et al., 2010, p. 2); and (3) Financial statement users need a better assessment of the true performance and management of the firm than allowed through historical cost (Argilés et al., 2011). As regards the advantages of the HCA model compared with FCA, they are the following: (1) Fair valuation is subjected to more manipulation and is a poorer measure of worth and performance than historical cost accordingly; (2) “Accounting cannot compete with the market in valuing a firm” (Watts, 2006; as cited in Argilés et al., 2011, p. 90); (3) “Fair valuation does not necessarily make investors better off, and that its usefulness has not been demonstrated” (Ball, 2006; as cited in Argilés et al., 2011, p. 90); (4) “Fair value accounting is liable to produce absurdities and misleading information, if it is based on expectations that turn out to be false” (Rayman, 2007; as cited in Argilés et al., 2011, p. 90); and (5) Fair value “inherits more managerial manipulation and induces less efficient investment decisions than cost valuations” (Liang & Wen, 2007; as cited in Argilés et al., 2011, p. 90).

The authors have systematised researchers’ opinions of general assessment of FVA model (see Table 4).
Table 4

**General Assessment of FVA Model**

<table>
<thead>
<tr>
<th>Positive argument</th>
<th>Negative argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fair value information enhances decision usefulness and transparency, as it is timely reflected in current market conditions (Fisher et al., 2010).</td>
<td>FVA comes at the expense of reliability and understandability, referring to the need to sometimes use somewhat arbitrary market-based values that rely on subjective means of establishment (Barlev &amp; Haddad, 2003; Penman, 2007; Benston, 2008; as cited in Fisher et al., 2010, p. 1).</td>
</tr>
<tr>
<td>An asset is reflected in the balance in its fair value, if its prime cost is smaller than its market price (Kalniņa, 2006).</td>
<td>How to determine the costs of ascertaining such values, particularly for reporting entities in the developing countries (Fisher et al., 2010)?</td>
</tr>
<tr>
<td>The importance of analytical financial information increases for its users (Kuzmina, 2006).</td>
<td>The annual revaluation requirements imposed by IAS 41 might prove difficult and expensive, particularly in less developed countries (Elad, 2004; as cited in Fisher et al., 2010, p. 4).</td>
</tr>
<tr>
<td></td>
<td>The undesirable effects of increased volatility of the reported earnings (Fargher, 2001; Penman, 2007; as cited in Fisher et al., 2010, p. 1).</td>
</tr>
<tr>
<td></td>
<td>Fair value does not always reflect the true economics of business (Fisher et al., 2010).</td>
</tr>
<tr>
<td></td>
<td>The extension of FVA to a range of assets, industries, and countries has raised concerns about the ability of one measurement system to be all things to all stakeholders, with many of the key requirements being tailored to assets where active market is prevalent (e.g., financial instruments) (Penman, 2007; as cited in Fisher et al., 2010, p. 1).</td>
</tr>
<tr>
<td></td>
<td>Increased company income tax risk for small and medium companies, where accounting is done mainly for fair tax calculation reasons (Kalniņa, 2006).</td>
</tr>
</tbody>
</table>

*Note. Source: The authors’ own study based on systematised researchers’ opinions.*

Application of the principle of fair value allows preparing a higher-quality financial statement from the point of view of financial management (Kuzmina, 2006). In the further process of analysis based on financial reporting quality characteristics, the authors have systematised the main concepts of theoreticians regarding the assessment of biological assets.

When preparing an annual report, the agricultural companies should reflect an objective accounting value of a biological asset on the balance and correctly reflect the value changes in the profit and loss account so that the included information should meet all the quality criteria: relevance, reliability, comparability, and understandability. Two primary criteria required by accounting standards are relevance and reliability (Argilès et al., 2011; Jaunzeme, 2007).

The prior research provides an overall conclusion that fair value-based information is more relevant than historical cost-based information (Argilès et al., 2011).

In Tables 5 and 6, the authors have summarised cognitions of theoreticians from the point of view of relevance and reliability.

Table 5

**Assessment of FVA Model From the Point of View of Relevance**

<table>
<thead>
<tr>
<th>Positive argument</th>
<th>Negative argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Including unrealised gains or losses in the reported profits provides users with more timely information that is relevant to assess their investment and the efforts of management over the period (Herbohn, 2005; as cited in Fisher et al., 2010, p. 4).</td>
<td>There is frequently too much uncertainty regarding the ultimate realisation of many agricultural revenues (Herbohn, 2006; as cited in Fisher et al., 2010, p. 4).</td>
</tr>
</tbody>
</table>
(Table 5 continued)

<table>
<thead>
<tr>
<th>Positive argument</th>
<th>Negative argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income fluctuations reflect investment risks in the agricultural sector. (Fisher et al., 2010).</td>
<td>Allowing recognition of estimates in income statements could result in significant adjustments in subsequent periods and may create pressure on companies to declare and pay dividends for which no funds are available (Herbohn, 2005; as cited in Fisher et al., 2010, p. 4).</td>
</tr>
<tr>
<td>It gives a more proper basis for the estimation of future cash flows compared with historical cost, as it reflects the current market value of these cash flows (Kuzmina, 2006).</td>
<td>This allows greater opportunities (and motivation) for companies to massage their accounts in any financial year, depending on whether they wish to show higher or lower earnings (Herbohn, 2006; as cited in Fisher et al., 2010, p. 4). Therefore, income management sphere distinctly increases when subjective valuation methods are required.</td>
</tr>
<tr>
<td>It minimizes the risk of accounting policy (or the risk of fair valuation) (Kuzmina, 2006).</td>
<td>Active markets are essential for valuating relevant objects, and consequently the provision of qualified professional assessors (Kuzmina, 2006).</td>
</tr>
<tr>
<td>It minimises the risk of relevance of managerial activities regarding optimization of taxes (Kuzmina, 2006).</td>
<td>It increases the institutional risk (coordination of administrative bodies regarding regulation) (Kuzmina, 2006).</td>
</tr>
</tbody>
</table>

Note. Source: The authors’ own study based on systematised researchers’ opinions.

Summarising findings of different scholars, the conclusion is that from some aspects, the fair value method for biological asset evaluation is better than the cost account method, but it is not ideal either. Thus, it is necessary to find alternatives.

Table 6
Assessment of FVA Model From the Point of View of Reliability

<table>
<thead>
<tr>
<th>Positive argument</th>
<th>Negative argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAS 41 provides “a good conceptual framework” for meeting the information needs of different stakeholders, but some practical difficulties should be noted in operationalizing the standards” (Fisher et al., 2010, p. 4).</td>
<td>The principal concern is when active markets for biological assets do not exist. In such instances, reporting entities may have to estimate fair values by determining the net present values (NPVs) of future cash flows, yielding inherently subjective valuations (Fisher et al., 2010, p. 4). Unlike an objective value from an external market, net present value is highly dependent on the discount rate and growth projections used in the calculation (Dowling &amp; Godfrey, 2001; as cited in Fisher et al., 2010, p. 4).</td>
</tr>
<tr>
<td>FVA application to certain non-severable biological assets, such as grapevines, may result in “false or misleading statements and a reduction in trusting the presentation of relevant financial information” (Fisher et al., 2010, p. 4).</td>
<td>For many assets and obligations assessed by FVA, market prices are not available (Kuzmina, 2006). Problems of mathematical calculations of hypothetical market prices (fair value) (Kuzmina, 2006).</td>
</tr>
<tr>
<td></td>
<td>The accountants face the problem of defining the market values —what exactly is it? Defining the market value is subjective to a certain extent (Dziļuma, 2000).</td>
</tr>
</tbody>
</table>

Note. Source: The authors’ own study based on systematised researchers’ opinions.

According to Bradbury (2008; as cited in Bonaci & Strouhal, 2011):

It is possible that replacement cost is a better measurement method on some dimensions, deprival value is better on other dimensions, and even historical cost is better on certain dimensions. Thus, it is still possible for fair value accounting to be, on average, the best. (p. 19)

Taking into account that none of the previously offered methods can be applied without caution, the
authors offer an alternative method for biological asset evaluation, namely, the discounted cash flow (DCF) method. Biological assets, for instance, a cattle herd, are a long-term investment with an aim to gain profits in the future. The asset value is closely connected with future revenues from the use of this asset. From this point of view, it may be considered as an investment project.

Specific project evaluation methods exist for this purpose, for instance, NPV, internal rate of return (IRR), modified IRR (MIRR), and the project value indicators are linked to the project revenues (Revenues should exceed the cost of the project).

Both quantitative and qualitative indicators are used for the project evaluation. Quantitative indicators reflect project expenses and expected income in absolute terms, such as the milk yield per year, feed costs, the number of units, veterinary expenses, etc.. These criteria can be easily set, tested, and evaluated.

Qualitative criteria define the project quality parameters, such as the selection of a new breed, etc.. For testing their fulfilment, one needs more complicated evaluation methods, for instance, observations, expert evaluation, and testing.

Recent findings in financial economics emphasize the growing role of cash flow measures in company valuation models and assessment of the financial position of an enterprise. Given the measurement problems in accrual accounting, more and more investors and other users of financial statements are beginning to focus on company cash flows instead of earnings of a firm (Subatnieks, 2007).

Future cash flow of biological assets may be mathematically depicted in the following way (see Table 7):

Cash flow stream from investment is indicated as $CF_t$ in time $t = 0, 1, 2... T$, where the expenses at the beginning are: $CF_0 < 0$.

<table>
<thead>
<tr>
<th>Biological asset type</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>..........</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle herd</td>
<td>$CF_0$</td>
<td>$CF_1$</td>
<td>$CF_2$</td>
<td>..........</td>
<td>$CF_T$</td>
</tr>
</tbody>
</table>

Note. Source: The authors’ own study.

New Zealand and Australian accounting bodies were unified in their belief that certain agricultural assets (e.g., livestock) should be valued at their net current value. Underpinning the choice of net current value is a view that it provides more relevant information to the producers, farm advisers, and other relevant users (Fisher et al., 2010).

The IAS 41 requirements allow using DCF method for biological assets assessment in some situations, and annual accounts law allows using this method for assessment of financial instruments (International Accounting Standards Committee, 2000; Supreme Council of Republic of Latvia, 1992a).

Broad application of cash flow is possible in ascertaining the sources and uses of cash, explaining the difference between earnings and cash changes, evaluating a company’s ability to settle debts and pay dividends, and predicting a company’s future cash flow (Subatnieks, 2007).

The abovementioned investment evaluation methods require choosing a relevant discount rate, which may be interpreted as sunk capital cost possibilities. Discount rate may be based upon government bond yields in the investment period as well as on the project risk degree. The chief risks for biological assets in the dairy farming sector, for instance, a cattle herd, are diseases, insects, etc..

The main disadvantages of the abovementioned methods are uncertainty of cash flow projections and
isolation of the model variables. It may happen to be impossible to affect the most sensitive variables against NPV. These methods do not analyse the interactions among elements of a system within time. The economic crisis and its consequences do not allow using the traditional statistical and economic forecasting methods which cannot provide adequate evaluation of the future processes.

Ambiguous circumstances require finding principally new methods—approaches where statistically uncertain relationships have a minor role. In such conditions, the role of expert methods increases, while for totally obscure circumstances, one of the actual working methods is system dynamics (Skribans, 2010).

The system dynamics method has become a modern everyday approach to find business problem solutions. System dynamics is one of research directions of systems which analyze a system's behaviour within time depending on the structure of the system's elements and their interactions, including cause and effect relationships, reciprocal links, reaction time to exposure, etc. Economic system dynamics explores the aggregate of economic relationships affecting the object by applying relationships’ mathematical equations, calculation algorithms, and special computer programs for simulation modelling. The main task of the system dynamics method is to reflect the real relationships in the model by imitating behaviours of the economic object. The next step after creating the model is an experiment with the help of the model and analysis of the results (Skribans, 2008).

The system dynamics method was created and developed by J. Forrester in the end of the previous century. Currently, the most popular book on system dynamics is *Business Dynamics: Systems Thinking and Modelling* by Sterman (2000). One of the first to offer the system dynamics model onto the market of innovations and new product introduction was Frank Bass in 1969 (Bass diffusion model (BDM)). Currently, there are many modifications of this model for market investigations.

System dynamics software is part of decision-support group programs, e.g., Stella, IThink, Studio, Vensim, etc. The most recommended programs for entrepreneurship are Stella and IThink.

In further research, the authors will justify the possibilities of system dynamics for biological assets evaluation, develop a model, make experiments, and carry out an analysis. Grain crops and milk are definitely the most important Latvian agricultural products. Therefore, the experiment will be carried out in assessment of biological assets of a dairy farming company.

The main advantages of the proposed method are several dependent variables, e.g., energy price, land tax, asset life expectancy, productivity, breed, milk purchase price, by-products, and related products. By changing one or several mutually dependent variables or parameters, it is possible to simulate different situations, which is a great advantage compared with the DCF method.

**Conclusions**

Analysing the normative legislation for preparing financial statements of agricultural enterprises, prior researches, and expert publications regarding assessment aspects of biological assets, the authors have identified the following:

(1) In order to state truthful economic operation of an agricultural enterprise, compare the financial indicators to those of competitors and average sector indicators, discover untapped potential and occurred mistakes, and evaluate potential risks for all these, the quality of information included in the annual report is of vital importance;

(2) The choice and application of evaluation methods of biological assets and products obtained from them.
give different values in several profit and loss account items leading to different results in analyses of financial statements, company value, and tax account from economic activities. It leaves an impact on operational and strategic managerial decisions and statistical data of the state agricultural sector;

(3) According to parameters of economic activities, the companies registered in Latvia are subjected to different normative legislation and standards regarding the assessment of biological assets. The standards do not explicitly contain provisions for the evaluation of objects or differ in requirements and application of accounting principles in agricultural companies. Therefore, financial statements are not comparable, and external users of the financial statements on an international scale may misinterpret the information given in a Latvian company and thus be misled;

(4) Annual accounts law allows assessment of biological assets using both models. Thus, financial reports of enterprises of agricultural sector are not comparable. The assessment criteria set by the annual accounts law do not provide all possible situations;

(5) There is a discrepancy among the requirements of normative documents regarding stock assessment procedures. Consequently, users of the external financial report at the international level can be misled by the information reported in the Latvian company’s financial statement;

(6) Latvian accounting regulations do not always give explicit directions, and IAS is considered as the best practice to find directions or solutions;

(7) A change from the cost account method for assessing biological assets to the fair value method may be evaluated positively. However, researchers have found many imperfections in this method as well;

(8) Taking into account that none of the current methods can be applied without caution, the authors offer the DCF method as an alternative;

(9) Recent findings in financial economics emphasise the growing role of cash flow measures in company valuation models and in assessment of the financial position of an enterprise and analysis of the economic condition. The main disadvantages of the abovementioned methods are: uncertainty of cash flow projections and isolation of the model variables. It may happen to be impossible to affect the most sensitive variables against NPV. These methods do not analyse the interactions among elements in a system within time;

(10) The economic crisis and its consequences do not allow using the traditional statistical and economic forecasting methods which cannot provide adequate evaluation of the future processes;

(11) Ambiguous circumstances require finding principally new methods—approaches where statistically uncertain relationships have a minor role. In such conditions, the role of expert methods increases, while for totally obscure circumstances, one of the actual working methods is system dynamics.

References