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# AMENDMENTS TO IAS 16 AND IAS 41: ARE THERE ANY DIFFERENCES BETWEEN PLANT AND ANIMAL FROM A FINANCIAL REPORTING POINT OF VIEW?

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## Abstract

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The aim of the paper is the evaluation of appropriateness of different ways for the measurement and reporting of different groups of biological assets. There are two possible ways of their measurement – cost and fair value. The substance of all kinds of biological assets differs significantly, especially for plants and animals. The single way for measurement of all kinds of biological assets is not satisfactory. The most significant difference is observable between bearer plants and biological assets in the form of living animals. The authors took into account a majority of factors influencing quality of individual ways of measurement, and evaluated the application of the above-mentioned methods for representatives of both kinds of biological assets (apple orchard and dairy cows). The results of the study proved that the historical cost is the suitable way of bearer plants measurement, while the fair value measurement is more suitable for measurement of living animals.

Keywords: Biological assets, measurement, bearer plants, living animals, historical costs, fair value.

## INTRODUCTION

Despite the significant roles of agriculture in the economy, the world leading accounting standard setters such as the International Accounting Standards Board (IASB) and the Financial Accounting Standards Board (FASB) had paid only a little attention to the special character of accounting for the agricultural production process.

Before 1998 a variety of measurement methods were used for the biological assets measurement, the most common being historical cost (Herbohn *et al.*, 1998, Dowling, Godfrey, 2001). The first significant departure from historical cost measurement in agriculture is evident in Australian financial reporting. The fair value measurement was considered as an alternative to historical costs. The net market value represents the concept of the fair value less costs to sell. Especially in the case of biological assets which do not have any liquid market such as orchards, vineyards, the determination of fair value could be considered very difficult.

The IASC (International Accounting Standard Committee – predecessor to IASB) was inspired by Australian agricultural reporting (AASB 1037) in the development of special treatments for reporting of agricultural activity – IAS 41 (International Accounting Standard) – Agriculture. Both standards require biological assets to be measured at the fair market value less selling costs with any changes in value over an accounting period included in income statement as gain or loss. Herbohn, Herbohn (2006), Barth (2004), Dowling, Godfrey (2001), Liang, Wen (2007), Penttinen *et al.* (2004) stressed possible manipulation of financial statements due to this way of reporting. On the other hand, according to Argilés, Blandon, Monllau (2011) the nature of agriculture makes the historical-based valuation of biological assets difficult because of the effect of procreation,

growth, death and other typical problems of agricultural activities such as joint-cost situations. The fair value measurement in comparison to a historical cost model reflects the biological transformation process and the increase in value during the production cycle due to the special biological character of transformation.

According to Damian *et al.* (2014) the differences in individual agricultural activities such as tree plantation, cultivation of plants, viticulture, raising livestock, forestry, annual or perennial cropping, fish farming are so high that generalization of treatments for agricultural reporting is not quite suitable. Despite this fact, the IAS 41 had used only one way of valuation method (fair value measurement) for all biological assets. According to the IAS 41 Agriculture, all biological assets had to be measured at fair value less estimated cost to sell at initial recognition and at a subsequent reporting date. There are the following main exceptions – IAS 41.24, IAS 41.25 and IAS 41.30. In accordance with IAS 41.24 in limited circumstances, cost is an indicator of fair value, where little biological transformation has taken place or the impact of biological transformation on price is not expected to be material. IAS 41 presumes that fair value can be reliably measured for most biological assets. However, that presumption can be rebutted for a biological asset that, at the time it is initially recognised in financial statements, does not have a quoted market price in an active market and for which other methods of reasonable estimation of fair value are determined to be clearly inappropriate or unworkable. In such a case, the asset is measured at cost less accumulated depreciation and impairment losses. But the entity must still measure all of its other biological assets at fair value less costs to sell. If circumstances change and fair value becomes reliably measurable, a switch to fair value less costs to sell is required. In accordance with 41.25 biological assets that are physically attached to land are measured as biological assets separate from land. In some cases, the determination of the fair value less costs to sell of the biological asset can be based on the fair value of the combined asset (land, improvements and biological assets).

As a conclusion of studies carried out on this issue (Booth, Walker (2003), Argilés, Slof (2001), Elad (2004), Herbohn, Herbohn (2006), Foo (2006), Thurrun, Bakir (2010)) the IAS 41 Agriculture was considered to be revised. The method of biological assets measurement was identified as the most significant subject of revision.

The conclusion of the above mentioned studies and the criticism of practical application of the fair value measurement for all kinds of biological assets resulted in the inclusion of a limited scope project concerning the biological assets measurement to the IASB's 2011 Agenda Consultation.

Due to the fact that in May 2011, the IFRS 13 Fair value measurement was published and the new guidelines for the fair value determination were introduced, there was strong support for the limited scope project concerning the biological assets measurement completion. The issue of determination of the fair value of non-financial assets is based on the perspectives of market participants of their highest and best use. In IAS 41, it was possible to use a residual method for the biological assets that are physically attached to land measurement. The fair value measurement guidelines in IAS 41 were replaced by IFRS 13. It triggered a discussion concerning the fair value of combined biological assets determination. Based on the IFRS Interpretation Committee Meeting in March 2013, the IASB decided to develop a cost-based model for bearer biological assets valuation which resulted in the Amendments to IAS 16 and IAS 41 publication. These amendments are intended to define bearer plants and extend the scope of IAS 16. The amendments concern bearer plants, not livestock. The final Amendment Agriculture: Bearer Plants (Amendments to IAS 16 and IAS 41) was issued on 30 June 2014, and it is effective from 1 January, 2016.

The main aim of the paper is the evaluation of appropriateness of different ways of measurement and reporting of different groups of biological assets. A major impetus for the evaluation is the publication of the new amendments to IAS 16 and IAS 41 – Agriculture: Bearer Plants and IFRS 13 – Fair value measurement. According to the Amendments to IAS 16 and IAS 41 plants, which are used only for growing produce are treated as property, plants and equipment while bearer animals such as cows, sheep, laying hens are treated as biological assets according to IAS 41. There are not any experiences with application of these amendments. Only a limited amount of research was carried out on this issue (Silva, Nardi, Ribeiro (2015), Gonçalves, Lopes (2015), Hinke, Stárová (2014), Damian *et al.* (2014)).

## MATERIAL AND METHODS

The paper is concerned with the biological assets measurement and reporting. The demonstration of possible effects of different ways the biological assets measurement on agricultural reporting and performance of business entity during the useful life of these assets is employed.

In the context of IFRS 13 – Fair value measurement, which was published in 2011, some of the treatments of IAS 41 – Agriculture became unsuitable for practical application. In particular, the fair value measurement of biological assets in the form of combined assets (orchards, vines, bamboo, sugarcane) when applying §25 IAS 41 could be in conflict with basic financial reporting principles, especially true and fair view of biological asset due to application of „the highest and the best use" for raw land measurement. This situation resulted in a proposal recommending that the IASB should add a limited-scope project on

bearer biological assets to its agenda in September 2012. This effort has resulted in the publication of amendments to IAS 16 and IAS 41 – Bearer plants.

The research amplifies the conclusions of authors' previous studies concerning agricultural reporting (ZE 2012, ZE 2016 in print). The authors' research is focused on biological assets value quantification (bearer plants and living animals) at their initial recognition and after their initial recognition. The impact on financial statements items is also the subject of the research. Statistical data regarding the selected biological assets are used for the quantification of the impact on the affected financial statements items.

The orchard of fruit trees is considered as a suitable representative of bearer plants. Due to the climatic conditions of the Czech Republic the apple trees were selected for processing. The small dairy farm is chosen as a representative of living animals kept for other purposes than slaughtering for meat.

The data in the form of Situational and forward-looking reports (Fruits, Milk, Meat) and reports concerning the cost efficiency presented by the Institute of Agricultural Economics and Information are employed. Subsidies received are not taken into account in the comparison. Subsidies related to bearer assets are reported as deferred revenue according to IAS 20.

The information relating to fruit-growing from the horticultural and economic point of view was synthetized for quantification purposes. All the information is related to one hectare of apple orchard with average production and expected useful life of 13 years. The useful life of intensive planting of apple trees is 10–15 years in average (Lokoč *et al.*, 2013, Kudová, 2006).

The information relating to breedings animal from the animal production and economic point of view is synthetized for quantification. All the information is related to one cow as part of small group consisting of twenty cows. The selection is based on the survey of Agrisportal (2013).

The animal production information concerning the most widespread breed of dairy cattle in the Czech Republic – Holstein Friesian cattle is selected for the research, the average age of 14–15 months is considered as an age of conception. Five to six years is supposed as an average length of useful life, weight at slaughter is in the interval from 650 to 700 kg (Bouška, 2006).

In the case of bearer plants the time series of 1993–2014 are taken into account to consider the biological character of biological assets production and to quantify the influence of climatic conditions and price effects in predicting production and cash flows for each year of useful life of bearer plants. The costs and revenues were adjusted to get present value at the measurement date to eliminate the effects of inflation in each period. These details are subject of Tab. I. To quantify the discounted cash flows the time value of money according to IFRS 13 was considered.

Risk and uncertainty in the biological assets fair value determination is taken into consideration. The expected present value of cash flow technique – Method 1 (EPV1) in accordance with IFRS 13 B25 is employed in the case of bearer plants. Present values of possible cash flows serve as a basis of group cash flow, which is the probability weighted average of all possible future cash flows. The resulting estimate corresponds to the expected value that is statistically weighted average of the possible values of discrete random variables and the corresponding probabilities are used as weights.

The fair value is estimated for all years of the biological assets useful life using moving values (minimum, average, and maximum) for the estimated series of 13 years. The details are subject of Tab. II. The minimum value of the corresponding time series is employed for the pessimistic estimation of cash flows, the maximum value is employed for the optimistic estimation of cash flows, the average of appropriate time series is employed for the realistic estimation. The appropriate probabilities are assigned to particular options.

Fair value based on discounted cash flows for each year is expressed by the following formula DCF calculation:

$$DCF_{j\ (\min,\ \max,\ avg)} = \begin{pmatrix} \sum_{j=1}^{12} \frac{CF_j}{(1+i)^{j-1}} \\ \sum_{j=2}^{12} \frac{CF_j}{(1+i)^{j-2}} \\ \vdots \\ \sum_{j=11}^{12} \frac{CF_j}{(1+i)^{j-11}} \\ \frac{CF_{12}}{(1+i)^{j-12}} \end{pmatrix}$$

Where:

| | |
|---|---|
| $j$ | useful life of bearer plant |
| $i$ | interest rate |
| $CF_j$ | moving minimum, average, maximum of period from $j$ to $j + 9$ |
| $DCF_{min}$ | Discounted cash flow – pessimistic option – in the year $j$ |
| $DCF_{avg}$ | Discounted cash flow – realistic option – in the year j |
| $DCF_{max}$ | Discounted cash flow – optimistic option – in the year $j$. |

The discount rate is represented by the average rate on risk-free monetary assets that have maturity dates or duration that coincide with the period covered by the cash flows and pose neither uncertainty in timing nor risk of default to the holder (i.e. a risk-free interest rate). A discount rate of 1% is considered in this case. The interest rate is based on a survey made by Strašák (2015).

The probability is taken into account in the fair value calculation. The probability of 20% of pessimistic scenario ($p_1$), 60% of realistic scenario ($p_2$) and 20% of optimistic scenario ($p_3$) *i*s estimated. According to management's approach to risk, it is estimated. The information concerning the risk is based on the subjective approach to risk (Kahneman, 2012).

$$FV(j) = p_1 . DCF_{jmin} + p_2 . DCF_{javg} + p_3 . DCF_{jmax}$$

In the case of living animals the determination of fair value is easier to get in comparison to bearer plants. The information concerning fair value is got from the active market (Agrarian Chamber of Czech Republic: Market report – beef and pork) and average weight for each weight category (Bouška, 2006, Brstenský, Mihina, 2006).

Biological assets in the form of bearer plants (apple-trees orchard) are measured at the cost (using the quantification of costs based on the procedures for setting up orchards according to the norms for agricultural and food production (The norms for agricultural and food production). The standard belt planting (1,125 pcs of dwarf trees per hectare) is considered. The estimated cost of seedlings is 105 CZK/pc (based on the survey), the estimated cost per one hectare represents CZK 450,000, including seedlings. The orchard is depreciated over the average useful life of 13 years evenly (it is expected that the disposal costs of the orchard and revenues obtained from the sale of timber will be at the same level).

Biological assets in the form of living animals (cows) are measured at the cost (using the quantification of cost based on cost per feeding day until reaching productivity). For maximization of milk yields and minimization of the cost of breeding the age of 24 months and weight after calving of approximately 560 kg are usually recommended (Tozer and Heinrichs, 2001). Ettema and Santos (2004) proved the best economic outcome is achieved when Holstein heifers are calved between 23 and 24.5 months of age. The cost of 450 CZK per insemination (sperm + insemination) is considered.

## RESULTS

The subject of the following part is a comparison of impacts of different ways of bearer plants and living animals measurement.

### Biological assets under IAS 41 and under Amendments to IAS 16 and IAS 41

There was not any special difference between plants and animals in IAS 41. There were definitions of consumable assets and bearer biological assets in IAS 41, while according to the Amendments to IAS 16 and IAS 41, living plants that are used in the production or supply of agricultural produce, which are expected to yield for more than one year, not intended to be sold as a living plant or harvested as agricultural produce, except for incidental scrap sales were defined as bearer plants. Consumable assets are plants or livestock that are to be harvested or sold as biological assets (livestock for meat or fur production, livestock held for sale, crops, and trees being grown for lumber).

The new Amendments take into account the substance of biological assets and the process of biological transformation and classify biological assets into two groups for valuation purposes – bearer plants and the other biological assets. The fair value measurement was used for all biological assets and agricultural produce at recognition and after recognition. The Amendments should reduce a subjective point of view in bearer plants measurement and allow the historical cost model application(costs accumulated until maturity) while the produce of bearer plants is measured separately from these plants and the fair value model is employed.

The determination of the fair value of fruitive plants, grape vines, tea bushes, oil trees and rubber trees is greatly influenced by the fact that for these plants in the growth phase there is no active market, they are connected with the place where they are grown and it is not possible to move them during a period of fruitive and trade separately from the relevant land.

According to the Amendments to IAS 41 and IAS 16 bearer plants are measured at cost less any accumulated depreciation and impairment, with changes recognized in profit or loss or at fair value at each revaluation date less any subsequent accumulated depreciation and impairment.

Assuming the substance of biological transformation in the case of bearer assets, in a form of plants, there are similar cycles in which costs without obtaining associated benefits in the form of biological production (fruits, wine grapes, etc.) are spent in the early stages. This phase could be considered similar to the self-construction of fixed assets. Similarly to fixed assets, where the life cycle and accounting methodology could be divided into the procurement phase, the use phase and the phase of decommissioning. In the case of plants the life cycle could be divided into similar stages (a period of growth, period of fertility and gradual death and destruction).

The period of growth is similar to the phase of acquisition, in the case of bearer plants, it is the time from the growth of the tree till the emergence of economically important fertility. This period differs in lengths for different types of bearer plants (small fruits – 2–5 years, vineyards – 4 years, stone fruits 3–6 years, dwarf fruit trees – 3 years, 7–14 years for pears, etc.). All costs incurred for bearer plants during this period are considered as part of cost. The cost could include also provision for decommissioning (if it is material).

The period of full fertility and growth is characterized by decreasing the intensity of

the vegetative parts growth. Fertility of bearer plants is almost regular. This stage is similar to the use phase of fixed assets. During this stage, the bearer asset should be depreciated. The straight–line depreciation or depreciation reflecting the course of fertility during the fertility period could be employed. The length of this period is dependent on the type of bearer plant, variety, climate, etc. (10–15 years in average, maximum 20 years). The depreciable amount is depreciated during this period and it is dependent on the acquisition cost of bearer plants and the residual value. The residual value includes the value of timber reached of fruit trees (fuel or furniture industry).

The bearer biological assets in the form of living animals (dairy cows, sheep bred for wool, laying hens) are measured at fair value less estimated cost to sell according to IAS 41. The Amendments to IAS 16 and IAS 41 do not extend to animals.

## Bearer plants measurement comparison

### Fair value model application for bearer plants

The following table shows the input data utilized for the fair value measurement of biological assets in the form of apple orchard (1 ha) based on discounted cash flows. According to the pomicultural theory dwarf trees older than twenty years can be considered as almost worthless trees due to obsolete varieties, diseases or damage, soil contamination by pesticides, and with respect to the declining trend in fertility. For this reason, useful life of 16 years (3 years to achieve fertility and 13 years of fertility) is considered.

Input data were used for the fair values of biological assets during the useful life (apple orchard) estimation. Annual changes in the fair value during the useful life are presented in Tab. II.

I: *Input data for fair value of bearer plants estimation*

| Year | Yield (t/ha) | Price (CZK/t) | Direct cost (CZK/ha) | Revenues (CZK/ha) | Profit (CZK/ha) |
|---|---|---|---|---|---|
| **1** | 11.86 | 6,399 | 43,362 | 75,892 | 32,530 |
| **2** | 10.3 | 8,828 | 47,737 | 90,928 | 43,191 |
| **3** | 12.83 | 11,784 | 49,213 | 151,189 | 101,976 |
| **4** | 16.01 | 8,409 | 51,479 | 134,628 | 83,149 |
| **5** | 13.7 | 7,784 | 49,320 | 106,641 | 57,321 |
| **6** | 15.97 | 8,219 | 48,127 | 131,257 | 83,130 |
| **7** | 21.57 | 8,432 | 52,911 | 181,878 | 128,967 |
| **8** | 15.57 | 8,246 | 48,024 | 128,390 | 80,366 |
| **9** | 18.33 | 8,548 | 53,013 | 156,685 | 103,672 |
| **10** | 17.15 | 8,289 | 50,166 | 142,156 | 91,990 |
| **11** | 17.97 | 9,967 | 64,918 | 179,107 | 114,189 |
| **12** | 15.26 | 8,048 | 67,096 | 122,812 | 55,716 |
| **13** | 17.62 | 8,920 | 71,005 | 157,170 | 86,165 |
| **14** | 13.13 | 10,256 | 74,908 | 134,661 | 59,753 |
| **15** | 17.9 | 10,371 | 97,741 | 185,641 | 87,900 |
| **16** | 16.68 | 7,808 | 97,658 | 130,237 | 32,579 |
| **17** | 11.85 | 8,607 | 104,070 | 101,993 | -2,077 |
| **18** | 9.18 | 9,856 | 92,417 | 90,478 | -1,939 |
| **19** | 13.68 | 9,624 | 110,394 | 131,656 | 21,262 |
| **20** | 13.78 | 9,761 | 111,609 | 134,507 | 22,898 |
| **21** | 14.1 | 10,262 | 114,806 | 144,694 | 29,888 |
| **22** | 13.99 | 12,700 | 115,058 | 177,673 | 62,615 |

Source: own calculation based on data Situační a výhledové zprávy – ovoce, ÚZEI information

II: *Fair value estimation according to IAS 41 and IFRS 13*

| Year | Estimation | | | Fair value using DCF[1] | Change in FV |
|---|---|---|---|---|---|
| | Pessimistic | Realistic | Optimistic | | |
| **0** | 309,897 | 877,373 | 1,452,926 | 878,988 | 0 |
| **1** | 280,140 | 804,711 | 1,337,199 | 806,294 | -72,694 |
| **2** | 239,318 | 723,075 | 1,220,314 | 725,771 | -80,523 |
| **3** | 185,438 | 639,358 | 1,102,260 | 641,154 | -84,617 |
| **4** | 131,018 | 556,400 | 983,026 | 556,649 | -84,505 |
| **5** | 76,055 | 474,975 | 862,599 | 472,716 | -83,933 |
| **6** | 20,542 | 389,648 | 740,968 | 386,091 | -86,625 |
| **7** | -12,158 | 308,574 | 618,121 | 306,337 | -79,754 |
| **8** | -10,182 | 239,924 | 508,971 | 243,712 | -62,625 |
| **9** | -8,186 | 178,900 | 398,730 | 185,449 | -58,263 |
| **10** | -6,170 | 125,589 | 287,387 | 131,597 | -53,852 |
| **11** | -4,134 | 78,724 | 174,930 | 81,394 | -50,203 |
| **12** | -2,077 | 39,905 | 87,900 | 41,107 | -40,286 |
| **13** | 0 | 0 | 0 | 0 | -41,107 |

Source: own calculation based on data Situační a výhledové zprávy – ovoce, ÚZEI information
[1]Selling costs are not taken into account

## Cost model application for bearer plants

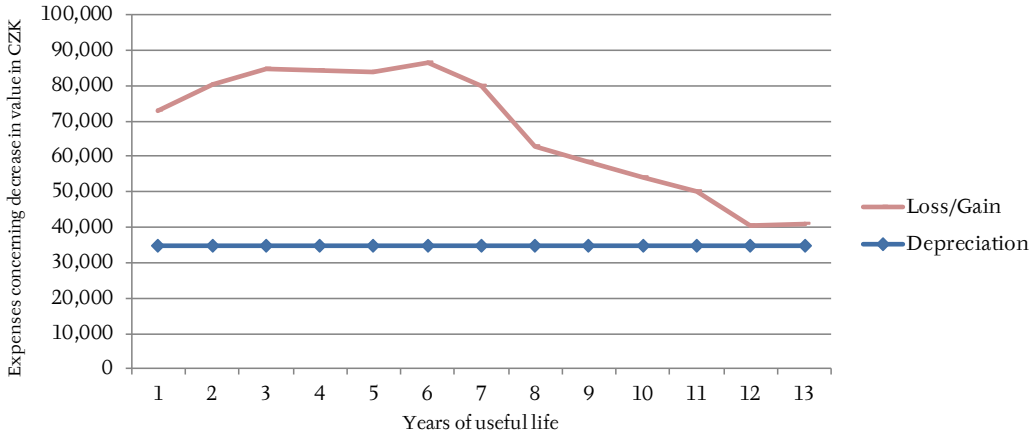
Costs of the foundation are quantified according to the agro-technical standards (Kavka, 2004) of activities related to the apple orchard in the form of an intense band planting dwarf apple-trees. The estimated time to reach full fertility is three years. Costs connected to the foundation of an orchard incurred during the first three years (until full fertility) – standard cultivation technology (tie 4 × 2.5 m, dwarf tree planting) concerning the land preparation before planting (fertilization, deep plowing, smoothing), planting seedlings (pegging, digging pits, fixing trees – 1,125 pcs, estimated cost 105 CZK per pc) and the first three years treatment (cutting, soil treatment, herbicide application, etc.). The total estimated cost of apple orchard setting up is 450,000 CZK according to standards.

The cost incurred during the starting period (first three years) is depreciated during the useful life of bearer plants. Development of carrying amount impact on earnings in the form of depreciation is in the Tab. III and Fig. 1.

III: *Cost model – straight line depreciation*

| Year | Carrying amount (CZK) | Depreciation (CZK) |
|---|---|---|
| **1** | 415,385 | 34 615.4 |
| **2** | 380,769 | 34 615.4 |
| **3** | 346,154 | 34 615.4 |
| **4** | 311,538 | 34 615.4 |
| **5** | 276,923 | 34 615.4 |
| **6** | 242,308 | 34 615.4 |
| **7** | 207,692 | 34 615.4 |
| **8** | 173,077 | 34 615.4 |
| **9** | 138,462 | 34 615.4 |
| **10** | 103,846 | 34 615.4 |
| **11** | 69,231 | 34 615.4 |
| **12** | 34,615 | 34 615.4 |
| **13** | 0 | 34 615.2 |

Source: own calculation




1: *The impact on expenses using the fair value measurement and cost model*

## Bearer living animal measurement comparison

### Fair value model for bearer living animal measurement

The information relating to dairy cows as a representative of bearer living animal synthetized from the animal production and economic point of view is subject of the following tables. All the information is expressed per one cow. The average weight of a new born calf is 38 kg. The age of 15 months is considered as an age of conception and the age of 24 months is considered as an age of calving. The length of useful life employed in the research is supposed to be 5 years and weight at slaughter is supposed to be 660 kg. The information concerning weight and age is in the Tab. IV and V.

IV: *Weight proportion during the useful life*

| Period | % of the weight of an adult cow (WDC) |
|---|---|
| **1st conception** | 55–60 |
| **1st calving** | 85 |
| **2nd Calving** | 92 |
| **3rd calving** | 96 |

Source: Vacek *et al.* http://www.vuzv.cz/sites/File/skot/ekonomika/Metodika_odchovu_jalovic.pdf

V: *Fair value estimation*

| Month | Weight (kg) | Weight gain (kg) | Fair value per kg (CZK) | Fair value per [2]pc (CZK) | Change in Fair value (CZK) |
|---|---|---|---|---|---|
| **0** | 38 | 38 | 65 | 2,280[3] | 2,280 |
| **10 days** | 45 | 45 | 52 | 2,340 | 60 |
| **10 days-6** | 200 | 155 | 55 | 11,000 | 8,660 |
| **6-15** | 480 | 280 | 46,80 | 22,434 | 11,434 |
| **24 before calving** | | No relevant | No relevant – qualitative change | 27,000 | 8,280<br>4,566 |
| **24 after calving** | 560 | | 35 | 19,600 | -7,400 + value of new born calf 2,280 + milking |
| **36** | 610 | | 35 | 21350 | 1,750 |
| **48** | 635 | | 28 | 17,780 | -3,570 |
| **60** | 660 | | 28 | 18,480 | 700 |

Source: own calculation
[2]Selling costs are not taken into account
[3]Kopeček (2012) http://www.agritech.cz/clanky/2012-1-12.pdf

VI: *Cost of dairy cow calculation*

| | Feeding days | Cost per day | Increase in carrying value |
|---|---|---|---|
| **New born calf** | | | 2,280 |
| **Calves till 6 months** | 170 | 53 | 9,010 |
| **Heifers till 24 months** | 450 | 54 | 24,300 |
| **Insemination cost** | | | 450 |
| **Total** | | | 36,040 |

Source: own calculation
Estimated Revenues at the end of the useful life: 660kg * 28 = 18,480 CZK
Depreciable amount: 36,040 – 18,480 = 17,560 CZK

VII: *Dairy cow depreciation*

| Year | Carrying amount | Depreciation |
|---|---|---|
| **0** | 36,040 | 0 |
| **1** | 30,187 | 5,853 |
| **2** | 24,334 | 5,853 |
| **3** | 18,480 | 5,854 |

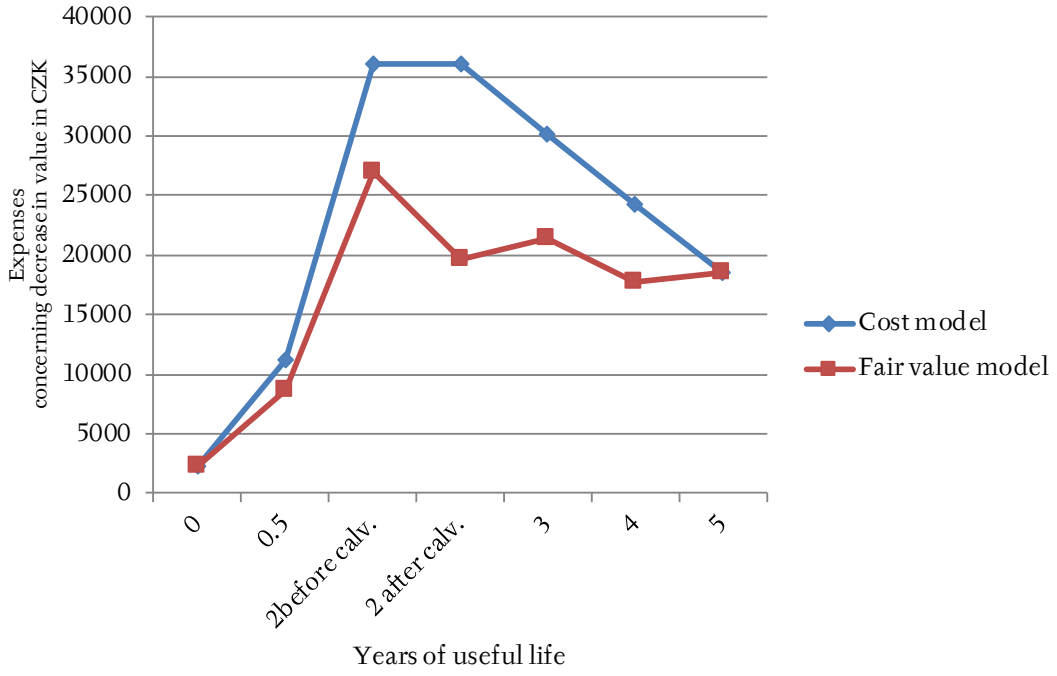
Source: own calculation

## Cost model for bearer living animal measurement

The costs of dairy cows breeding incurred until maturity are capitalized and are considered as the carrying amount at the bearer animal recognition. The cost includes acquisition cost of animals in the case of purchase, the value of a new born animal in the case of own regeneration. The value of a new born animal is dependent on the valuation method used (weight multiplied by internal price).

The other costs of breeding until maturity include (feeding, bedding, manure removal) (Živočišná produkce a technologie – výrobní technologie a sumární ukazatele v ŽV, 2013). The supposed time to reach maturity is 24 months. The total estimated cost of a dairy cow is about 35,000 CZK.

The cost incurred during the starting period (24 months) is depreciated during the useful life of bearer plants. The development of carrying amount impact on earnings in the form of depreciation is expressed in the Tab. VI and VII and Fig. 2.




2: *Fair value and Cost model comparison*
Source: own processing

## DISCUSSION

As it is evident from the tables and figures above, in the case of bearer plants the fair value based on DCF in comparison to historical cost is significantly higher. The fair value estimation is largely based on estimations of: a useful life of bearer plants, yields of bearer plants, market prices, consideration of climatic condition, regular expenses concerning the bearer plants, and interest rate for discounting for relatively long period of time. These estimations are connected with significant uncertainty, which is considered by probability of scenarios of individual cash flows. The estimation could lead to overestimation or underestimation of fair value of bearer plants in the early years of useful life. The changes in fair value of bearer plants reported as gains or losses in the income statement affect performance of business entity, they could affect decision making of users of financial information. The information on fair value for assets associated with the land is not crucial information because the separate sale of these assets without land is out of the question. The information on fair value rather reflects ability of the assets to produce cash flows over the remaining useful life of this asset. High volatility in DCF estimation can cause high volatility in profit or loss reported in income statement.

In contrast, the cost model takes into account the level of costs incurred by the entity on acquiring the relevant bearer plants and allows recognition of these costs over the useful life of the bearer plants. The effect of decrease in ability to generate positive cash flows is reported as a depreciation of bearer assets during the useful life.

Due to the fact that the value of bearer plants after the useful life is supposed to be very low or nil, fair value measurement of bearer plants can be considered as an enormously time consuming and inaccurate anyway. As can be seen in the figure above, fair and book value differ from each other mainly in the early stages of the useful life of bearer plants. The difference decreases at the end of useful life (this also confirms the conclusions of the studies of Argiles, Slof (2002), which dealt with comparing of the fair value and the carrying amount of biological assets in Spain and concluded that differences in biological assets through various methods of valuation are not significantly different).

In the case of living animals bred for other product than meat – bearer animals, the situation differs. First – there is an active market for living animals, the information on the fair value is available immediately, without any additional effort and cost. Second – the useful life is shorter than the useful life of bearer plants. Third – the residual value is significant for living animals. Fourth – business entity could generate positive cash flows from these assets by exploitation of animals during their useful live, or by their sale. The animals are ready for sale instantly. The fair value measurement application is suitable. Financial information users could exploit this information for their decision making.

The information on cost concerning living animals until reaching productivity is relatively difficult to obtain. The information is based on calculation of internal cost per feeding day for each category, calculation of internal cost of a new born animal in the case of own reproduction. This information is not necessary to present to external users.

Comparing the fair value model and cost model for living animals reporting, the fair value model seems to be more precise.

All above mentioned arguments speak in favour of the use of cost model of bearer plants measurement and fair value measurement for living animals. Authors appreciate the IASB activity in issuing Amendments to IAS 16 and IAS 41 Bearer plants. According to these amendments, the bearer plants are treated as property, plants and equipment and it is allowed to use the cost model in measurement of bearer plants.

## CONCLUSION

There are two possible ways of biological assets measurement – cost and fair value. The substance of all kinds of biological assets differs significantly, especially plants and animals. The single way for measurement of all kinds of biological assets is not satisfactory. The most significant difference is observable between bearer plants and biological assets in a form of living animals. The authors took into account majority of factors influencing quality of individual ways of measurement – laboriousness, demand on the input data for the measurement, availability of input data, and other specific knowledge demand, and based on results of the study, they evaluated application over mentioned methods for biological assets.

As it is clear from previous analysis, measurement at fair value using the DCF method is based on estimations of future cash flows and their probabilities and requires a relatively large source of input data for this estimation over the useful life of bearer plants. It is necessary to use the data for a relatively long period of time in relation to the useful life of bearer plants (twice the lifetime – for the purposes of calculation moving values) to take into account the nature of the production of biological and climatic and weather conditions and to be incorporated the most possible situations. The effect of this way of measurement is controversial. Although the objective of fair value measurement is to

achieve a true and fair view, in this case, the fulfilment of this objective is at least controversial, since the biological assets in the form of bearer plants cannot be separately traded and thus definition of fair value (*the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date*) could not be fulfilled. The historical cost is the more suitable way of bearer plants measurement.

The situation in the living animals' measurement is quite different. It is quite easy to obtain the fair value information. There are liquid markets for living animals.

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