Assessment of Biological Assets in Agribusiness

Recebimento dos originais: 09/11/2020
Aceitação para publicação: 25/10/2021

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Abstract

The objective of this study was to provide evidence and compare the measurement and valuation of biological assets in agribusiness with other sectors that have them, to identify whether the 18 companies in the sample adopted the guidelines contained in CPC 29 homogeneously, identifying the degree of disclosure of biological assets in the 2018 annual financial statements. We adopted the method of analysis of variance, factorial ANOVA, and correspondence analysis to verify the association between the characteristics of the companies and the level of compliance. The main results showed that there was a significant reduction of 15p.p. the level of compliance in relation to CPC 29 and when compared to previous studies, in addition to the lack of standardization in the information provided, which makes it difficult for external users to understand and compare information. We observe that the sectors linked to Brazilian agriculture, when compared to other sectors, are the ones that best present their biological assets, even if they are not the ones that have the greatest representation in relation to their total assets. Another point identified was that the larger the company, the higher its level of compliance, and companies that have a lower return on assets have greater compliance.

Key words: CPC 29. Fair Value. Disclosure. Agrobusiness.

1. Introduction

The process of convergence of Brazilian accounting standards to international standards through Laws no. 11,638/2007 and 11,941/2009 and the Comitê de

Pronunciamentos Contábeis (CPC) brought with it a challenge for companies and professionals in the accounting area to clearly show the fair values of their assets in the statements. If such changes were a great challenge for organizations, so it was also for rural producers, since the measurement of the fair value of biological assets generates divergences both in the academic environment and in the professional environment.

Biological assets comprise any live animal and/or plant and agricultural production. It is the product harvested from the entity's biological assets, and a fair value assessment should be applied to them (CPC 29, 2009). Fair value is defined as “the price that would be received for the sale of an asset or that would be paid for the transfer of a liability in an unforced transaction between market participants on the measurement date” (CPC 46, 2012, p. 3). The measurement of this fair value is intended for a particular asset or liability. When measuring fair value, companies should take into account the characteristics of the 'asset' or 'liability' when pricing them on the measurement date if market participants also take these characteristics into account, such as the condition and location of the asset and restrictions, if any, for the sale or use of the same (CPC 46, 2012).

Thus, considering the difficulties presented in the process of valuing biological assets and measuring their fair value, this paper seeks to answer the following research problem: what is the degree of disclosure of biological assets by publicly traded Brazilian companies listed on Brasil Bolsa e Balcão (B3), linked agribusiness?

To this end, the general objective is to compare the degree of disclosure of biological assets by publicly traded Brazilian companies, listed in B3, linked to agribusiness with other companies that have biological assets. Specifically, we seek to: (i) analyze the annual balance sheets for the year ended 2018 in selected companies; (ii) clarify in detail the measurement and evaluation of the biological assets of these companies and; (iii) identify whether the guidelines contained in CPC 29 are fully adopted by them.

This study contributes by offering support for the advancement and improvements in research related to biological assets, thus the theoretical contribution presents the need for accounting to portray the values of biological assets closer to reality in the disclosure of statements, consolidating the use of international standards, in addition to stimulate research on this theme.

Regarding the practical contribution, there is the relevance and representativeness of agriculture in the Brazilian economic scenario. According to statistical data from the Center for Advanced Studies in Applied Economics (CEPEA), in 2020, the Gross Domestic Product (GDP) of Agribusiness grew by 24.3% (CEPEA, 2020), while the Brazilian GDP ended the

year 2020 with a drop of -4.1% compared to the previous year (IBGE, 2020). Thus, it is necessary to have adequate conditions for evaluating the data reported in the financial statements of Brazilian agribusiness companies, contributing to an efficient management in the understanding of cost control techniques with the application of procedures that meet agricultural production and that are able to recognize the deviations in order to mitigate them. The aim is also to contribute to the disclosure of the composition of the price of biological assets, strengthening and showing the extent of convergence of international accounting standards in the Brazilian scenario.

In this context, we promote the fields of knowledge of cost accounting and agribusiness in this research. The integration of these themes provides support to interested parties in order to provide information in the preparation of strategic plans, resulting in assertive and timely decisions, as strategic cost management deals with the precept of developing and identifying superior strategies to produce competitive and sustainable advantages considering the normative issues of the segment.

The article initially contextualizes what biological assets are, their disclosure and measurement, in the second part it makes a presentation of Technical Pronouncement CPC 29 that establishes the accounting treatment, and the respective disclosures, related to biological assets and agricultural products, followed by a survey of previous studies. Then there is the description of the methodology and later performs the analysis of the results obtained in the research. Finally, the study's contributions and suggestions for future studies are described.

2. Literature Review

2.1 Biological Assets: Measurement and Disclosure

International Accounting Standards 41 (IAS 41) refers to the standard issued specifically to cover biological assets, which are defined as every living animal or plant. The standard provides for the accounting treatment for these assets establishing the criteria for recognition, measurement and disclosure of the entire process of biological transformation, which comprises the period of growth, degeneration, production and procreation, and for the initial measurement of agricultural products in the time and point of harvest. The purpose of the standard is to standardize the presentation and disclosure in the financial statements of firms that are part of this segment.

The literature addresses the accounting harmonization promoted by Law n. 11.638/07, which specifically discusses the recognition, measurement and disclosure of biological assets

and agricultural products that are subject to biological transformations. In the work of Silva et al. (2016), the authors presented the measurement of the biological asset of a herd of Nellore cattle on a rural property in Dourados-MS. Through exploratory research, they sought to demonstrate what would be the most effective measurement method for this asset. They identified with the analysis that it is necessary to maintain control of the biological asset and the best way to measure it is at fair value. They realized that the asset was sold without including all costs involved in production and was then sold for less than the real value. As the fair value measurement is detailed and separated the expenses generated by the asset during the period that it was in the producer's property, it avoids losses at the time of sale.

Amaro, Souza and Silva (2016) aimed in their study, to identify the biological assets recognized in the financial statements and to verify how these are measured by publicly traded companies in Brazil. The sample consisted of 35 of the 604 companies listed on the Comissão de Valores Mobiliários (CVM) that recognized biological assets between the periods 2010 to 2015. The results pointed out the Pulp and Paper sector as the main promoter, in monetary terms, with Fibria S/A being the most representative company segment. With the qualitative analysis of the explanatory notes, it was found that companies in the Pulp and Paper sector adopt the discounted cash flow model as a criterion for measuring fair value, which may lead to interpretation bias given the subjectivity of the technique.

Macedo, Campagnoni and Rover (2015) analyzed the level of compliance with CPC 29 for disclosure of biological assets in publicly-held companies in Brazil. Through a descriptive survey and analysis of the consolidated financial statements for 2013, with a sample of 19 companies, they observed that the average compliance with CPC 29 of these companies was 74.68%. In addition, they realized that the degree of compliance varies according to the size of the company and its characteristics such as sector, governance, profitability and representativeness of the asset.

Barros et al. (2013) analyzed the impact of fair value on the measurement of biological assets of companies listed on B3 in the years 2008 to 2010. The results revealed that the average of the values of these assets increased, but the information on biological assets provided in the notes explanations in general are superficial, insufficient to understand the real situation of these assets, due to the lack of data to analyze the criteria used in the recognition, measurement and disclosure of their biological assets.

Figueira and Ribeiro (2015) sought to verify the behavior of the disclosure of accounting information regarding the measurement of biological assets. A checklist based on CPC 29 (2009) was carried out, analyzing the financial statements of 30 publicly traded

companies, in the period from 2008 to 2012. It was found that biological assets were material in relation to the total assets, and that the The cash flow method stood out as an alternative for measuring fair value, given the lack of an active market at various stages of asset maturation.

Santos et al. (2015) sought to highlight aspects related to rural activity and the procedures used to measure the fair value of their biological assets. Information from the company Tropical Bioenergia S.A. was used to demonstrate the relevance of adopting fair value. They realized in their research that the measurement of the fair value of biological assets causes doubts in relation to the applicability, since it involves predictions with subjective data. They concluded that it is difficult to find companies active in the Agribusiness branch that present the recognition and measurement of their biological assets at fair value, considering that it is not a mandatory method.

Fiorentin et al. (2014) bring in their study a proposal for measuring biological assets in the production of roses, according to item 20 of CPC 29 (2009), which prescribes the present value of the expected cash flow as an alternative definition of fair value, given the current discount rate in the market. The general research objective was to present a proposal for measuring biological assets for production at fair value in flower production, based on the expected net cash flow, at the current market rate as indicated by CPC 29, and based on the cases studied. They concluded by proposing the measurement of biological assets for production by the expected Net Cash Flow. With similarities preserved (no active market, knowledge of the discount rate and future benefits of the asset), this measurement alternative can be extended to other biological assets.

Carvalho et al. (2013) analyzed the adoption of CPC 29 among the companies listed on the Bovespa Index. To this end, a content analysis of the companies subject to CPC 29 and present in the IBovespa Index was carried out. The annual and quarterly statements published in 2010 were used. They observed that the main sector, with 100% of companies with biological assets, is paper and cellulose and that 1/3 of the companies in the oil and gas sector recognize biological assets, while in the food and beverage sector the observed disclosure slice is 3/5. In addition, there was early adoption of the standards by five companies, one of which did not provide information on their biological assets in the annual financial statements.

2.2 CPC 29 and Biological Assets

Brazilian law introduced international accounting standards, International Financial

Reporting Standards (IFRS) through Laws no. 11,638/2007 and 11,941/2009, making it necessary for the accounting information disclosed to follow the determinations of the Comitê de Pronunciamentos Contábeis, so that they can be standardized. One of the obligations brought about with the adoption of international accounting standards is the measurement of the fair value of assets and liabilities, including biological assets (SANTOS et al, 2015). CPC 29, based on International Accounting Standards 41 (IAS), establishes that all biological assets must be measured at fair value.

As for the recognition of biological assets, one of the processes that precedes their measurement is the analysis of whether they meet the criteria established by the standard so that they are presented in the financial statements, as part of the balance sheet or in explanatory notes. Such criteria are: (i) it is probable that some future economic benefit related to the item will be received by the entity; and (ii) it has a cost or value that can be measured on a reliable basis (RECH, OLIVEIRA, 2011, p. 4). Elad (2004) considers that IAS 41 is a questionable topic as it presents most of the radical and comprehensive differences in historical costs, which can cause theoretical and practical problems. The author also states that using fair value can be a subjective valuation, for example, on similar asset values or using discounted cash flow, and this can cause difficulty in implementation in different countries.

Chart 1 summarizes the main requirements of the standard defined in CPC 29.

Chart 1 - Main requirements for accounting for biological assets and agricultural products

1st Description, dissertative or quantitative, of the amount of each group of biological assets and the accumulated amount;
2nd Distinction between consumable and production biological assets, or between mature or adult and immature or young biological assets;
3rd The gain or loss arising from the change in fair value less the sale expense of biological assets must be included in the income for the year that originates;
4th To demonstrate the method and significant assumptions applied in determining the fair value;
5th To evidence the existence and the total of biological assets whose legal title is restricted and the amount of them given as guarantee of liabilities;
6th To show the amount of commitments related to the development or acquisition of biological assets;
7th To highlight the financial risk management strategies related to agricultural activity;
8th Present the reconciliation of changes in the carrying amount of biological assets between the beginning and the end of the current period, which will include the gain or loss arising from the change in fair value less selling expenses;
9th Explanation of why the fair value cannot be measured reliably.

Source: Wanderley, Silva and Leal (2012).

Chart 1 summarized the main requirements for the accounting disclosure of the fair value of biological assets and agricultural products, according to the guidelines of CPC 29, by the entities producing them. CPC 29 (2009) also points out that plants such as tea bushes, vines, palm and rubber trees meet the definition of a carrier plant, being within the scope of

CPC 27, however, the carrier plant product is within the scope of reach of CPC 29.

2.3 Measurement at Fair Value

According to Rech et al. (2006, p. 2), fair value means the amount at which buyers and sellers would be willing to exchange their assets in an operation with a purely commercial basis. IAS 41 defines it as the amount for which an asset can be exchanged, or a liability settled, between knowledgeable and willing pastors, in a transaction in which no relationship exists between them (IAS 41, 2009).

Wanderley, Silva and Leal (2012) state that the premise that the fair value of biological assets can be measured reliably "can be rejected in the case of biological assets whose value should be determined by the market, however, this is not available and the alternatives to estimate it are not reliable "(WANDERLEY, SILVA, LEAL, 2012).

CPC 46 (2012) aims to, in addition to defining the fair value, establish in a single Pronouncement the structure for measuring fair value; and establish disclosures about fair value measurements. It is applicable when another Pronouncement requires or allows measurement of fair value or disclosures about measurement of fair value.

The measurement and disclosure requirements, however, do not apply to: (i) share-based payment transactions within the scope of CPC 10 – Share-Based Payment; (ii) leasing transactions within the scope of CPC 06 – Lease Operations; and (iii) measurements that have some similarities with fair value, but that do not represent fair value, such as, for example, the net realizable value referred to in CPC Statement 16 - Inventories or the value in use referred to Pronouncement CPC 01 – Reduction to the Recoverable Value of Assets (CPC 46, 2012).

In addition, the required disclosures are not required for: (i) plan assets measured at fair value in accordance with CPC 33 - Employee Benefits; (ii) (eliminated); and (iii) assets whose recoverable value is the fair value less disposal expenses, in accordance with Pronouncement CPC 01 (CPC 46, 2012).

Also in accordance with CPC 46 (2012), the company must disclose information that helps users of its financial statements to evaluate both options: (i) for assets and liabilities that are measured at fair value on a recurring or non-recurring basis Balance Sheet after initial recognition, the valuation techniques and information used to develop these measurements; (ii) for recurring fair value measurements that use significant unobservable data (Level 3), the effect of the measurements on the income for the period or other comprehensive income for the period.

To this end, the company must consider the following items: (i) the level of detail

necessary to meet the disclosure requirements; (ii) how much emphasis should be placed on each of the different requirements; (ii) how much aggregation or disaggregation should be carried out; and (iv) whether users of financial statements need additional information to assess the quantitative information disclosed (CPC 46, 2012).

3. Sample and Methodology

We collected in the Economática database and on the B3 website in relation to the financial and accounting statements, in the search for a standardization of these for said analysis. We consider the year ended 2018 for analysis, making it possible to verify the proper disclosure of biological assets by companies within the legal provisions brought by CPC 29 and to compare the agribusiness sector with the other sectors that have biological assets on their balance sheets, regarding the quality of their disclosure due to their fair value.

The sample of companies analyzed is made up of the publicly traded companies listed in B3 in the Segments: Fabrics, Clothing and Footwear, Agriculture, Sugar and Alcohol, Meat and Derivatives, Wood, Paper and Pulp and Steel, for having biological assets in their balance sheets, totaling 18 companies, as shown in chart 2.

Chart 2 - Research Sample

Sector	Subsetor	Segment	Companies
Cyclic Consumption	Commerce	Fabrics, Clothing and Footwear	Grazziotin S.A.
	Fabrics, Clothing and Footwear	Yarns and Fabrics	Karsten S.A.
Non-cyclical consumption	Agriculture	Agriculture	Brasilagro S.A., CTC - Centro de Tecnologia Canavieira S.A., SLC Agrícola S.A., Terra Santa Agro S.A.
	Processed Foods	Sugar and alcohol	Biosev S.A., Raizen S.A., São Martinho S.A.
		Meats and Derivatives	BRF S.A., JBS S.A., Marfrig S.A., Minerva S.A.
Basic Materials	Wood and Paper	Wood	Duratex S.A.
		Papel and Cellulose	Celulose Irani S.A., Klabin S.A., Suzano Papel S.A.
	Steel and Metallurgy	Steel	Cia Ferroligas da Bahia – FERBASA S.A.

Source: Brasil Bolsa Balcão – B3 (2019).

We analyzed the Balance Sheets (BS), the Statement of Income (SI) and the Explanatory Notes of the companies selected in the sample. In BS and SI we use the variables Total Asset, Current and Non-Current Assets, Biological Assets in the short and long term, Shareholders' Equity, Current and Non-Current Liabilities, Net income in a quantitative way.

The analysis of the explanatory notes took place in a qualitative way, in order to verify the agreement with the items requested by CPC 29, as shown in chart 3.

Chart 3 - CPC 29 disclosure items analyzed in company reports

Item 40	Did it disclose a gain or loss for the current period in relation to the initial value of the biological asset and the agricultural product, and also arising from the change in fair value, less the selling expense of biological assets?
Items 41 e 42	Did the entity provide a description of each group of biological assets (dissertative or quantitative)?
Items 43	Did the entity provide a description of the quantity of each group of biological assets, distinguishing between consumables and production or between mature and immature?
Item 46	The following statements were disclosed in the financial statements:
Item 46 - a	The nature of the activities involving each group of biological assets?
Item 46 - b	Non-financial measurements or estimates of physical quantities for each group of biological assets at the end of the period and/or agricultural production during the period?
Item 49	The entity disclosed:
Item 49 - a	The existence and the total of biological assets whose legal title is restricted, and the amount of them given as guarantee of liabilities?
Item 49 - b	The amount of commitments related to the development or acquisition of biological assets?
Item 49 – c	Financial risk management strategies related to agricultural activity?
Item 50	Has the entity reconciled changes in the carrying amount of biological assets between the beginning and the end of the current period?
If the fair value cannot be measured reliably	
Item 54	If the entity has measured its cost less depreciation and accumulated impairment, at the end of the period it disclosed:
Item 54 - a	A description of biological assets?
Item 54 - b	An explanation of why the fair value cannot be measured reliably?
Item 54 - c	A range of estimates within which there is a high probability of finding fair value (if possible)?
Item 54 - d	The depreciation method used?
Item 54 - e	The useful life or the depreciation rate used?
Item 54 - f	The gross total and accumulated depreciation (plus accumulated impairment loss) at the beginning and end of the period?
Item 55	If the entity has presented the accounting reconciliation of item 50, has it also presented irrecoverable losses, reversal of losses in the recoverable amount and depreciation for the period?
Item 56	If the fair value of biological assets, previously measured at cost, less any accumulated depreciation and impairment, becomes reliably measurable during the current period, the entity has released a description of the biological assets, an explanation of why the measurement of fair value has become reliably measurable, and the effect of the change?
If the company has a government grant	
Item 57-a	Did the entity disclose the nature and extent of government grants recognized in the financial statements?
Item 57-b	Did the entity disclose unmet conditions and other contingencies associated with the government grant?
Item 57 -c	Did the entity report the expected significant reductions in the level of government grants?

Source: adapted from Macedo, Campagnoni and Rover (2015) and CPC 29 (2009).

Table 4 summarizes the variables used in the research, together with the measurement criteria, the data source and the categorization performed. We used as a basis the studies by Macedo, Campagnoni and Rover (2015).

Chart 4 - Research Variables

Variable	Measurement criteria	Source	Categorization

Compliance Level	Total items highlighted by the company divided by the number of applicable metric items	Financial Statements and Explanatory Notes	1- High 2- Medium 3- Bass
Representation of Biological Assets	Biological Assets / Total Assets	Economática	1- High 2- Medium 3- Bass
Company size	Logarithm (Total Assets)	Economática	1- Large 2- Medium 3- Small
ROA - Return on assets	Net Income / Total Assets	Economática	1- High 2- Medium 3- Bass
Segment (Sector of Operation)	Categorical Variable	B3	1- Agriculture 2- Sugar and Alcohol 3- Meats and Derivatives 4- Pulp and Paper 5- Other Segments
Corporate governance	Categorical Variable	B3	1- New Market (NM) 2- Level 1 (N1) 3- Level 2 (N2) 4- Bovespa Mais (MA)

Source: adapted from Macedo, Campagnoni and Rover (2015).

In order to check the normal distribution of the variables, the Shapiro-Wilk tests were applied, which according to Fávero et al. (2014) is the most suitable for small samples, and Shapiro-Francia, which can also be used in larger samples. All variables showed a significance level above 0.05, rejecting the null hypothesis, so the data distribution is normal. Then, to check if the variances are homogeneous, the Levene test was continued, in which the sample variables are homogeneous, making it possible to apply parametric tests to analyze the data.

Among the parametric tests, the ANOVA Factorial test was chosen, since the dependent variable, quantitative, is influenced by more than one qualitative explanatory variable (FÁVERO et al, 2009). Hair et al. (2009) defines Analysis of Variance as a statistical technique used to determine whether samples from two or more groups arise from populations with equal means. We used the Correspondence Analysis (ANACOR) to check if there is a relationship between the level of compliance with CPC 29 and the other characteristics of the companies. According to Hair et al. (2009) this is a compositional approach in which the results portray objects and attributes in a common perceptual map.

4. Results and Discussions

One of the aspects analyzed in this study is the materiality of the biological assets of

the companies present in the sample, represented in Table 1. To obtain the representativeness of these assets, the ratio between the total biological assets over the total assets of each company was calculated.

As noted in Table 1, the segment with the highest representation of biological assets is Wood with 16.26%, followed by Pulp and Paper with 12.28% and Agriculture with 9.21%. With less materiality of biological assets, the Textiles, Clothing and Footwear (Company Grazziotin) segments stand out with 2.59% and Meat and Derivatives with 2.79%.

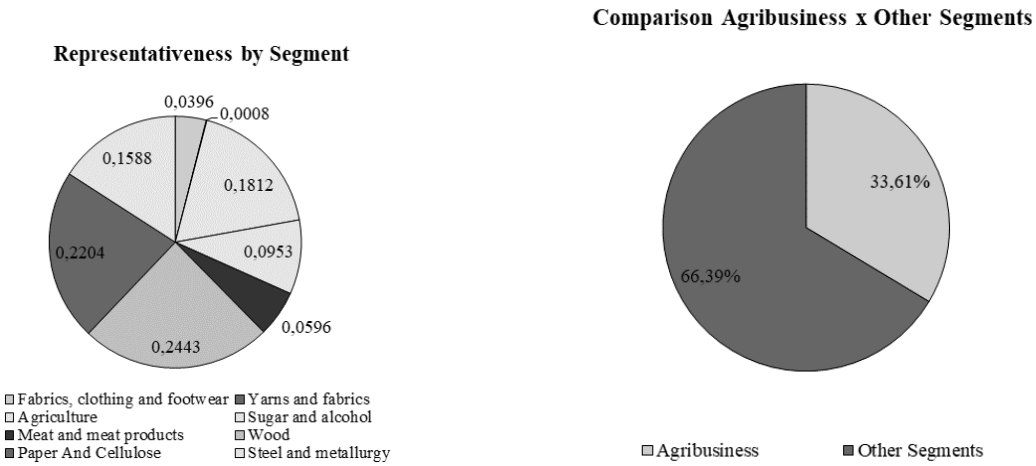
Table 1 - Representation of Biological Assets

Segment	Firm	Total Biological Assets (in R$ thousand)	Total Asssets (in R$ thousand)	Percentage of Company	Segment Percentage
Fabrics, clothing and footwear	Grazziontin	18,272,977.00	706,364,238.00	2.59%	2.59%
Yarns and fabrics	Karsten	164.00	341,884.00	0.05%	0.05%
Agriculture	Brasilagro	190,928.00	1,291,249.00	14.79%	9.21%
	CTC	820.00	816,894.00	0.10%	
	SLC Agrícola	705,390.00	5,755,537.00	12.26%	
	Terra Santa Agro	225,252.00	2,325,009.00	9.69%	
Sugar and alcohol	Biosev	386,723.00	8,381,829.00	4.61%	4.38%
	Raizen Energia	740,473.00	29,682,673.00	2.49%	
	São Martinho	571,543.00	9,467,258.00	6.04%	
Meat and meat products	BRF	2,574,447.00	42,382,377.00	6.07%	2.79%
	JBS	4,359,407.00	114,145,831.00	3.82%	
	Marfrig	16,570.00	26,504,272.00	0.06%	
	Minerva	156,698.00	12,824,421.00	1.22%	
Wood	Duratex	1,564,591.00	9,622,087.00	16.26%	16.26%
Paper And Cellulose	Celulose Irani	186,600.00	1,526,664.00	12.22%	12.28%
	Klabin	4,582,631.00	29,633,743.00	15.46%	
	Suzano Papel	4,935,905.00	53,932,644.00	9.15%	
Steel	Cia Ferroligas da Bahia - FERBASA	199,408.00	2,659,910.00	7.50%	7.50%

Source: search result.

Table 5 shows the comparison of the representativeness between the sectors, where the representativeness of the agribusiness sectors was verified. Thus, as expected, the Agribusiness Sector represents 66.4% of biological assets and 33.6% of other sectors.

Chart 5 - Composition of Representativeness by Sectors



Source: search result.

Chart 6 reinforces the issue of representativeness of biological assets, which is quite significant in different sectors of Agribusiness. They are mostly composed of Forests and Reforestation, Forest Reserves or Pinus and/or Eucalyptus Forests.

Chart 6 - Biological Assets by Company and Measurement Method

Firm	Fair value	Discounted Cash Flow (WACC)	Historical cost
Grazziontin	Forests and Reforestation		
Karsten	Soy, corn, beans and cotton		
Brasilagro	Cotton	Sugarcane and soy, corn and sorghum	
CTC	Cattle for production		
SLC Agrícola	Sugar cane	Cotton, soy and corn	
Terra Santa Agro			
Biosev	Cotton, soy and corn		
Raizen Energia	Sugar cane	Sugar cane	
São Martinho		Sugar cane	
BRF			Birds, pigs and others
JBS	Forests		Birds and eggs; Pigs and sheep (for breeding)
Marfrig	Cattle; Pigs and sheep (consumables)		Birds
Minerva	Cattle		
Duratex	Cattle		
Celulose Irani	Forest reserves		
Klabin		Eucalyptus and Pine Forests	
Suzano Papel		Eucalyptus Forests	
FERBASA		Eucalyptus Forests	

Souce: the authors.

Chart 6 also shows how to measure the fair value of the companies' biological assets. Considering the types of biological assets per company, 45% measure their fair value using estimates such as market value, average life cycle, laying and reproduction period, for live animals. Figueira and Ribeiro (2015) in their studies identified that in 2012 only 20% of companies used this adopted valuation methodology, that is, it shows that there was an

increase in this method by companies. Those biological assets measured at fair value less cost of sale, that is, by Cash Flow Discounted by Weighted Average Cost of Capital, totaled 34% for grains, plants and others, whereas in the same study mentioned above it was 37%, thus, suggests that this methodology practically remained.

In relation to the historical cost and in conjunction with another method, 21% of biological assets/companies are measured using this methodology, and still comparing with the research by Figueira and Ribeiro (2015), they were 23%. The methodology used by Figueira and Ribeiro took the company into account, while in our research we considered the types of biological assets in each company. Our research is in line with the findings of Scherch et al. (2013) who analyzed 24 companies with the competence of 2010 that did not identify companies that used only the historical cost as a methodology and contrasting the findings of Figueira and Ribeiro (2015), who identified 13% of companies.

Table 2 shows the percentage of compliance with CPC 29 of each company for the disclosure of biological assets. Some companies do not have government subsidies, which caused a difference in the quantity of items applied to each company. Among the companies that best disclose their biological assets are BRF, with 90% compliance with CPC 29, a situation different from the studies by Carvalho et al. (2013), who stated that Brasil Foods did not present data in other statements besides the balance sheet, nor in other explanatory notes other than the one on the main accounting practices, the initial adoption of the new standards and the specific note on biological assets, in followed by São Martinho with 85% and Celulose Irani with 80% compliance. It can also be verified that companies that presented in the studies by Carvalho et al. (2013) disclosure of information on biological assets in all items analyzed, had changes in this behavior, such as Klabin (75%) and Duratex (55%). An intriguing situation for more in-depth research on these companies, as for what reason would it take them to drop the level of disclosure previously presented. Among those with the lowest level of compliance stand out Karsten, with 15%, Grazziontin with 18% and CTC with 35% of compliance.

Table 2 - Compliance with CPC 29

Segment	Firm	Applied Items	Compliance Items	(%) Compliance	(%) Segment Compliance
Fabrics, clothing and footwear	Grazziontin	17	3	18%	18%
Yarns and fabrics	Karsten	20	3	15%	15%
Agriculture	Brasilagro	17	12	71%	56%
	CTC	20	7	35%	
	SLC Agrícola	20	11	55%	
	Terra Santa Agro	17	11	65%	

Sugar and alcohol	Biosev	20	14	70%	
	Raizen Energia	20	12	60%	72%
	São Martinho	20	17	85%	
Meat and meat products	BRF	20	18	90%	
	JBS	20	15	75%	74%
	Marfrig	17	10	59%	
	Minerva	17	12	71%	
wood	Duratex	20	11	55%	55%
Paper And Cellulose	Celulose Irani	20	16	80%	
	Klabin	20	15	75%	70%
	Suzano Papel	20	11	55%	
Steel	Cia Ferroligas da Bahia - FERBASA	20	14	70%	70%

Source: the authors.

The sectorial analysis points out flaws in the disclosure for the different segments of Agribusiness ('Fabrics, clothing and footwear' with 18%, 'Yarns and fabrics' with 15% and 'Wood' with 55%). The segment with the best level of compliance is 'Meats and Derivatives' with 74% compliance with CPC 29.

Table 3 shows the percentage of companies that correctly disclosed each item proposed by CPC 29. In the item 'description of biological assets' (Item 54-a), all companies disclosed the description of their biological assets; in the items on 'description of each group of biological assets' (88.89%), 'nature of activities involving each group' (88.89%), 'method used in depreciation' (88.89%).

Items such as 'estimates within which there is a high probability of finding fair value' and 'presented irrecoverable losses, reversal of losses in recoverable value and depreciation for the period' presented the lowest number of companies in compliance, with 22.22% and 27.78% respectively. When analyzing the explanatory notes of the companies, it can be seen that, if they do not carry out any activity, they do not disclose it in the document. For example, regarding item 49-a, about having biological assets as guarantee of liabilities, only one company, Minerva S.A. disclosed that it did not have such assets as guarantees. The other companies that disclosed, did so because they have these guarantees on biological assets.

Tabela 3: Análise dos Itens do CPC 29

Itens CPC 29	Item summary	Applied companies	Compliance with the item
Item 40	Discloses period gain or loss [...]	100,00%	77,78%
Items 41 e 42	[…] Description of each group of biological assets [...]	100,00%	88,89%
Item 43	[…] Description of the quantity of each group of biological assets, distinguishing between consumables and production […]	100,00%	77,78%
Item 46 - a	The nature of the activities involving each group […]	100,00%	88,89%
Item 46 - b	[…] Physical quantities of each group of biological assets […]	100,00%	72,22%

Item 49 - a	[…] Legal ownership is restricted, and the amount of them given as guarantee of liabilities?	100,00%	33,33%
Item 49 - b	[…] Acquisition of biological assets […]	100,00%	33,33%
Item 49 – c	Financial risk management strategies […]	100,00%	55,56%
Item 50	[…] Reconciliation of changes in the book value of biological assets […]	100,00%	83,33%
Item 54 - a	A description of biological assets?	100,00%	100,00%
Item 54 - b	An explanation of why the fair value cannot be measured […]	100,00%	83,33%
Item 54 - c	[…] Estimates within which there is a high probability of finding fair value […]	100,00%	22,22%
Item 54 - d	The depreciation method used?	100,00%	88,89%
Item 54 - e	The useful life or the depreciation rate used?	100,00%	83,33%
Item 54 - f	The gross total and the accumulated depreciation […]	100,00%	38,89%
Item 55	[…] Presented the irrecoverable losses, reversal of losses in the recoverable amount and the depreciation of the period?	100,00%	27,78%
Item 56	[…] Explanation of why the measurement of fair value has become reliably measurable, and the effect of the change?	100,00%	0,00%
Item 57 - a	[…] Nature and extent of government grants recognized in the financial statements?	72,00%	50,00%
Item 57 - b	[…] Unfulfilled conditions and other contingencies associated with the government grant?	72,00%	33,33%
Item 57 - c	[…] Significant expected reductions in the level of government grants?	72,00%	38,89%

Source: the authors.

Most of the items were only partially answered. As for item 56, which deals with 'the reason why the measurement of fair value has become reliably measurable', there was no company that disclosed it, making it understood that there was no change for any company.

When comparing the overall compliance level with the work done by Macedo, Campagnoni and Rover (2015), who applied the same items to 19 companies, although some items showed improvements in disclosure, the analysis of the whole shows a reduction in compliance levels with CPC 29, leaving a percentage of 73.68% for the year 2013, while the results of this survey returned only 58.89%.

The ANOVA Factorial parametric test was adopted to verify the influence that qualitative variables such as Corporate Governance and Sector of Performance can have on the dependent variable 'Compliance', in addition to the other quantitative explanatory variables used: 'Asset Profitability' (ROA), 'Size' and 'Representation of Biological Assets'. Thus, it was possible to verify whether any of these variables have a significant effect on the company's level of compliance. The ANOVA Factorial test is shown in Table 4.

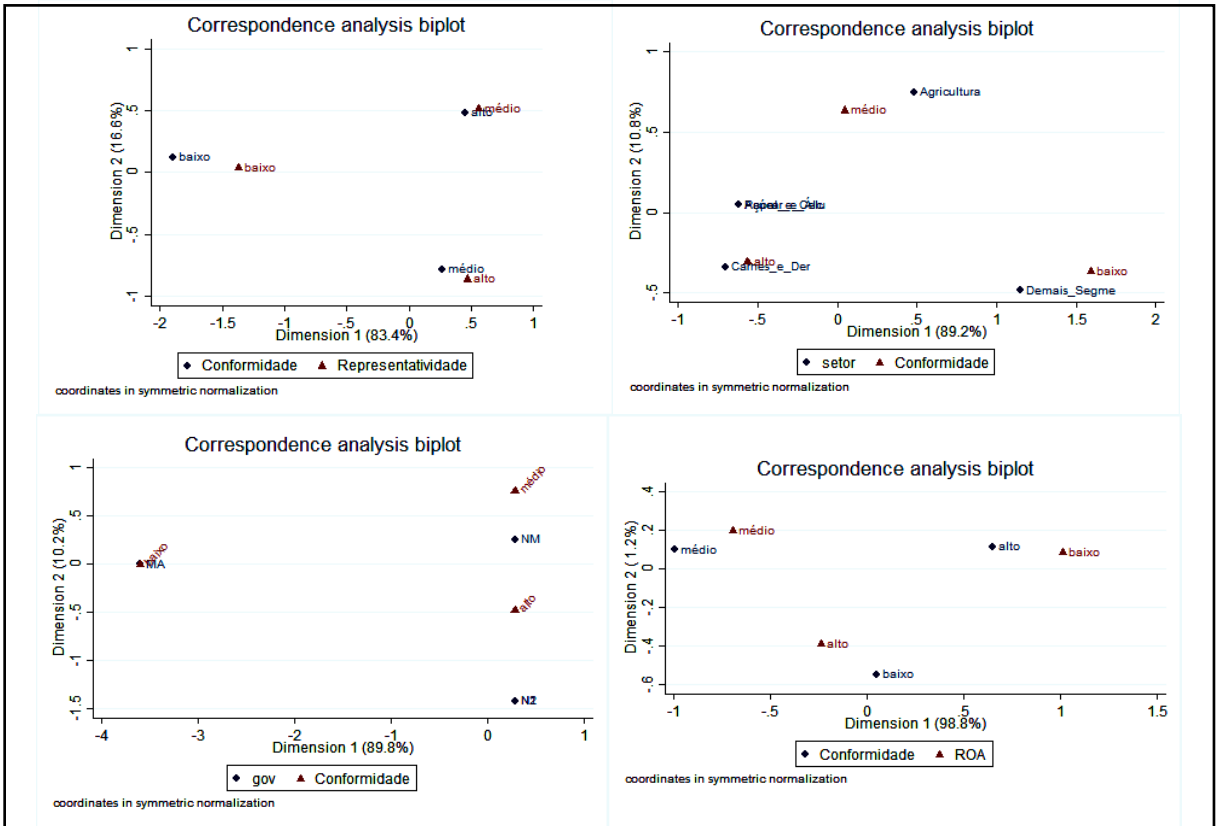
Tabel 4 - ANOVA Factorial

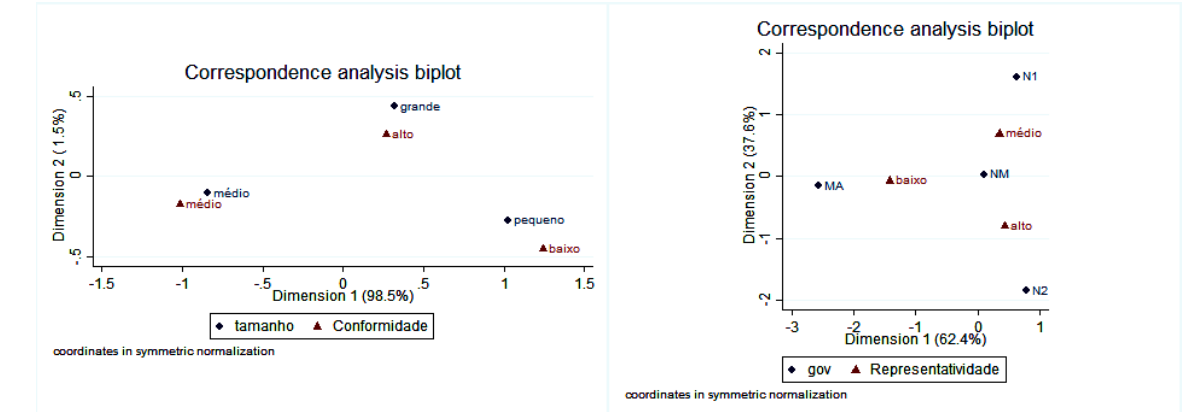
Source	Partial SS	Df	MS	F	Prob>F
Model	.19755443	10	.01975544	1.04	0.5536
Representativeness	.01347021	1	.01347021	0.71	0.4625
ROA	.00182724	1	.00182724	0.10	0.7772
Size	.00257318	1	.00257318	0.13	0.7378
Sector	.05657229	4	.01414307	0.74	0.6226
Governance	.07159749	3	.02386583	1.25	0.4292
Residual	.05724104	3	.01908035		
Total	.25479547	13	.01959965		
R Square =.7753 (R ajusted square =.0265)			Dependent variable: Compliance		

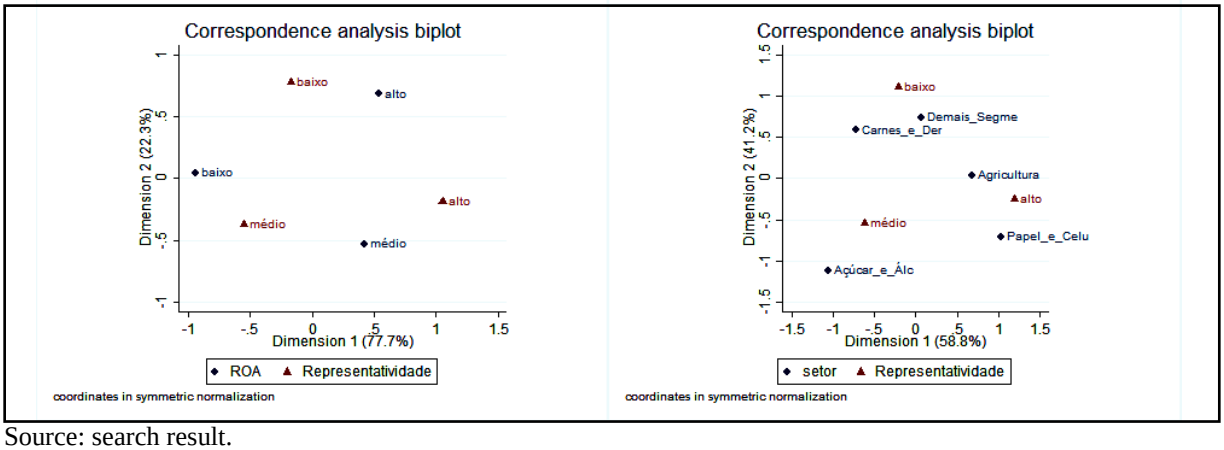
Source: search result.

From the ANOVA Factorial test presented, all variables showed a level of significance (p-value) greater than 0.05, concluding that none of the analyzed variables have a significant effect on the level of compliance. Correspondence Analysis was used to verify whether there is an association between the level of compliance with CPC 29 and the other characteristics of the companies, and between the representativeness of the biological asset with the other characteristics.

Table 7 - Perceptual Maps - correspondence analysis







Source: search result.

For Correspondence Analysis we divided the variables into groups (categorized). For the variable 'Size' we created three categories: (i) Large, (ii) Medium and (iii) Small. We categorize the variables 'compliance', 'representativeness' and 'ROA' as: (i) High, (ii) Medium and (iii) Low. As can be seen in Chart 7, the variables are associated with each other. Analyzing the associations between the level of compliance and the characteristics of the companies, it appears that:

i. companies with a high level of compliance are not those with a higher level of representativeness of biological assets. The companies that we classify with a high level of representativeness are in the average range of compliance with Technical Pronouncement CPC 29;

ii. when analyzing the sector of activity with the level of compliance, it is observed that the sector of Meats and Derivatives is the one that presents greater conformity with the norms, the Agriculture sector is associated with a medium conformity and the other segments (those who owned only one company with biological assets), is associated with the low level of compliance;

iii. The Novo Mercado level of Corporate Governance is associated between the medium and high levels of compliance, while Bovespa Mais is associated with low compliance;

iv. Companies with a higher return on assets (ROA) have a lower level of compliance and vice versa; those with lower ROA, higher compliance, this suggests that companies try to compensate for the lack of return by better disclosing and disclosing their information, perhaps in order to be more transparent to capital providers;

v. The size variable was directly associated with compliance, the larger the company, the greater the compliance; medium-sized companies, medium level of compliance and small companies, low compliance, this suggests that depending on the size of the company, it can invest more or less in systems to better handle the disclosure and disclosure of information;

vi. When analyzing the representativeness of biological assets with the Corporate Governance levels, the company at the Bovespa Mais level has less representation than those at the Novo Mercado, Level 1 and Level 2;

vii. The companies with the lowest profitability of the asset are those with an average level of representation, while those with the highest ROA have less representation of the biological asset in relation to their total assets;

viii. As for the sector in which it operates, Agriculture and Pulp and Paper are those that have the greatest representativeness, while Meats and Derivatives and the Other Segments, the least representativeness. Sugar and alcohol are associated with average representation.

Based on the analyzes carried out, we realized that the adoption of fair value has not had a significant impact on the companies in this study, even after a decade of implementation of CPC 29, there is still a lot to improve in terms of disclosure and disclosure, this makes it difficult to use of information by the external user in terms of understanding and comparability between companies. The pricing of live animals or plants and their biological transformations comprise the process of growth, degeneration, production and procreation and this reflects a qualitative and quantitative change in biological assets, which makes it a challenge for companies to use the best accounting practices (BARROS et al. 2013).

According to Barros et al. (2013), the current legislation on the registration of biological assets allows users of accounting information to have contact with a record arising from the fair value of the asset less the cost of sales and no longer at its original value or historical cost, recognizing the gain (or loss) only at the time of realization or sale. According to the authors, this change in registration allows the market to have contact with information closer to reality, since fair value determines the price that would be received to sell an asset or paid for transferring a liability on the measurement date, making registration with these

characteristics one of the most relevant changes for economic segments that have biological assets in their equity. Our survey showed 21% of the biological assets of the companies analyzed are still measured using this methodology.

5. Conclusions

This study aimed to compare the degree of disclosure of biological assets by Brazilian publicly traded companies, listed on B3, linked to agribusiness with other companies that have biological assets. From the data from Economática, a sample of 18 companies listed on B3 that recognize biological assets in their financial statements for the year 2018 was obtained. We performed the analyzes of compliance with Technical Pronouncement CPC 29 through the companies' Explanatory Notes. The 'agriculture' and 'meat and derivatives' sectors are those with the highest number of companies with biological assets, four in each sector, followed by 'paper and cellulose' and 'sugar and derivatives' with three each.

The company with the greatest representation of biological assets is Duratex, in the wood sector, with 16.26%. Grazziontin, despite its low level of representation, only 2.59%, is the one with the highest amount of biological assets on its balance sheet (R$ 18,272,977.00), however the company does not show these assets in its explanatory notes.

The company with the highest compliance with CPC 29 was BRF SA in the meat and derivatives sector, with 90%, which was even the sector with the highest compliance rate with 74%, followed by São Martinho (sugar and alcohol) with 85 % and Celulose Irani from the pulp and paper sector (80%). Grazziontin and Karsten were the ones that showed the lowest compliance with the rules of CPC 29, with 18% and 15% respectively. When compared to previous studies, overall there was a worsening in the percentage of the level of compliance. The work of Macedo, Campagnoni and Rover (2015) presented a percentage of 73.68% for the year 2013, while the results of this research returned only 58.89%.

As for statistical tests, we did not observe levels of statistical significance that explain the dependent variable 'compliance', since for all explanatory variables tested, the p-value was greater than 0.05. In the correspondence analysis, it was possible to verify the associations between the compliance variable and the characteristics of the companies. In general, sectors linked to agribusiness showed better levels of disclosure of their biological assets, as well as the size of companies, which had a direct relationship with compliance, that is, the larger the company, the higher the compliance rate. Another issue was that companies with lower return

on assets also have higher levels of compliance.

Based on the analyzes carried out, it is clear that the adoption of fair value has not had a significant impact on the companies in this study, even after a decade of implementation of CPC 29, there is still much to improve in terms of disclosure, disclosure and compliance, this makes it difficult for the external user to use the information in terms of understanding and comparability between companies.

This study contributes to the understanding of the importance of maintaining the quality of accounting information, aiming at understanding the external public as investors, in addition to assisting managers in their decision making. The omission of information makes it difficult to understand the information in the explanatory notes, in addition to the lack of standardization of these disclosures that can still be observed.

Given the limitation of this study for having performed a cross section analysis, (only for the year ended 2018) and thus not having obtained significant results regarding statistical tests, it is suggested for future studies a panel data analysis, with periods before and after CPC Technical Pronouncement 29 in order to compare the periods and the presence of changes (or not) in the levels of compliance over the years. A qualitative analysis of the quality of the information provided and the absence of standardization of explanatory notes would also be appropriate.

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