SUSTAINABLE FOOD: ANALYSIS OF FINANCIAL DATA AND ANIMAL WELFARE INCENTIVES OF GLOBAL COMPANIES WITHIN THE ANIMAL DERIVED FOOD INDUSTRY

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INTRODUCTION

The field of animal welfare science has helped us understand how animals perceive the world and what motivates them (WEBSTER, 2005). In recent years, this topic has gained much attention from Non-Governmental Organizations (NGOs) and regulators (HORNE and ACHTERBOSCH, 2008). In consequence of increased consumers and investors demand for more transparency and clarity in production processes, organizations now see animal welfare as a business issue (DANONE, 2014) that can either harm an organization's reputation or bring a competitive advantage for precursors (UNILEVER, 2015).

Organizations such as McDonald's suffered, in the 90s, significant media pressure from NGO's regarding animal welfare issues in cattle slaughterhouse processes among others (ANDERSON, 1999). Since then, they became one of the leading organizations in animal welfare policies, as shown by their Tier 2 position in the yearly business benchmark for animal welfare ranking (AMOS; SULLIVAN, 2015). In many cases, companies have a higher animal welfare standard than required by local and international governmental policies (MARK&SPENCER, 2015). This and many other examples show that NGOs and unsatisfied consumer demand can make huge organization, that before seemed untouchable, comply, with transparency, to more human farming methods. Ultimately, even though Restaurants and Retailers have limited responsibility in regards to their role in animal welfare practices across the value chain, negative public attacks makes them look responsible. This forces them to make sure that animal welfare practices are enforced across their value chain so their name are not associated with yet another scandal (ETHICALCORP, 2015). This shows that animal welfare is not an issue kept at some level of the value chain but a concern that needs to be integrated into the value chain strategy throughout the industry. All the incumbents, from animal producers to animal transporters, slaughterhouses to retailers and restaurants, put their businesses in critical situations when animal welfare regulations are not enforced. Consequently, it is common to see major organizations enforce their animal welfare policies and terminate business relationship when poor animal welfare standard have been exposed either by internal audit or third party investigations (STROMJAN, 2015).

By 2050, it is estimated that there will be 9 billion human to feed (FOOD AND AGRICULTURE ORGANIZATION, 2009). Actual consumptions mode and cultivated surface areas do not produce enough food for this populations (FOOD AND AGRICULTURE ORGANIZATION, 2009). Many experts suggest that food habits have to change, decreasing meat consumption significantly (BOURNE, 2015). Therefore, the animal derived food industry needs to address these challenges. For producers and their value chain, in the animal derived food industry, the risk lies in shrinking market share against non-animal food product aggravated by negative public opinion towards actual animal production practices. For meat producers and their value chain, superior animal welfare practices can be an opportunity to avoid this shift and take leadership. Standing out positively in the marketplace, either with specific product labels such as "animal welfare approved" or by appearing in animal welfare rankings such as the business benchmark on farm animal welfare (BBFAW), can be a

competitive advantage by enhancing customers' confidence and lowering the company reputation risks (BBFAW, 2015).

The objective of this study was to do an exploratory research assessing risks and opportunities in the animal derived food industry by comparing financial indicators and animal welfare practices depending on positions in the value chain, company regions and company sizes. We expect this analysis to help the animal derived food industry stakeholders better understand how animal welfare practices and standards can lead to a more sustainable and competitive industry.

LITERATURE REVIEW

Over the last 100 years, during the second industrial era, the agribusiness industry has seen tremendous changes in its production methods due to scientific discoveries and technological advances. Mass production methods and mechanical engineering helped the agribusiness industry reach the population's food demand. However, animal welfare concerns came to light with Ruth Harrison's book "Animal machines" (1964). In her book, Ruth Harrison describes intensive farming of animal as if they were machines. Shocked by Harrison´s findings, the government of the United Kingdom launched an investigation into farm animal welfare (MENCH, 1998). This led to the UK Government's Brambell Committee Report (BRAMBELL, 1965) describing the reality of intensive animal farming. Brambell then suggested (1965), what would become known as the 5 freedoms that animals should have: The freedom to stand up, lie down, turn around, groom themselves and stretch their limbs. It later served as the foundation of animal welfare as a formal area of study (CARENZI; VERGA, 2007). In 1979, the Farm Animal Welfare Committee codified the 5 freedoms.

Ever since, the concept of animal welfare has gained increasing attention from academics and has been extensively studied by various researchers from different fields. In 1986, Donald Broom became the world's first professor of animal welfare science (BROOM, 2005). Animal welfare science is now taught in more than 100 universities which shows how fast the interest for this field has grown over the past 30 years (ILLMAN et al., 2014). In the same timeframe, various NGOs focusing on animal welfare have been founded such as Compassion in World Farming (1967), PETA (1980) and World Animal Protection (1981). Even though Animal Welfare, as a science, has been around for the past 50 years, there is hardly a consensus for one unique definition. In fact, various contrasting definitions exist. These approaches can be divided into three main groups of scientific thought: functional, feelings, and natural behavior (CARENZI; VERGA, 2007).

The first definition, probably today the most accepted one, defines animal welfare as an animal's states in regards to its attempt to cope with its environment (BROOM, 1986). This means that whether the welfare is good or bad, animals will show different type of coping attitudes that can be measured in different ways either by behavioral, physiological or immunological factors (BROOM, 1991). When an animal fears for his safety, for example when a sheep is confronted by a dog, its heart rate tends to race. This physical symptoms show that animal distress affect the animal life equilibrium as a whole. Similarly, animal experiencing poor animal welfare can cope through different behaviors, such as biting bars, that they would not express normally. Not to mention that poor animal welfare increases injuries and diseases rates (BROOM, 1986).

Independent of which definition is used, omitting animal welfare present a number of risks and opportunities for the animal derived food industry. In practice, most organizations do not

take animal welfare into account and continue to focus, almost solely, on extensive production methods underestimating the externalities caused by their operations. It is only after successive environmental and food safety scandals, such as water source pollution by pig production in Brittany France (GOUESET, 2010), Bovine spongiform encephalopathy epidemic in Europe (VIE PUBLIQUE, 2004) or avian influenza in Asia (WHO, 2014), that authorities, public opinion and the animal derived food industry have raised concerns about more sustainable production methods (VIZARD, 2014).

Many NGOs defend that animal welfare should be regarded as a source of risk but also as a source of opportunity. For example, the Business Benchmark on Farm Animal Welfare (2014) considers animal welfare to offer risk management and strategic opportunities for the animal derived food industry. With a similar approach, some key industry players see animal welfare as an essential part of its sustainable agriculture policies (DANONE, 2014). Animal welfare is not only relevant for the animal derived food industry; it is one of its determinants to make it sustainable (EUROGROUP FOR ANIMALS, 2010). Thus we need to determine its impacts, as a value driver, in terms of risks and opportunities for the animal derived food industry.

In one hand, if poorly managed, animal welfare represents a series of risks. These risks include public safety, meat moralization or costly legal requirements. Safety risks have been numerous in recent years. As we saw with the Bovine Spongiform Encephalopathy (BSE) epidemic, poor animal welfare practices can cause grave dangers to public health, leading to the direct cost of lost production and product, legal lawsuit and the indirect cost of damaged reputation. These risks are not only isolated at the producing level. Indeed other players in the value chain can be exposed. During the BSE crisis McDonald's, reported as much as a 10% decrease in its European operation revenue and 6% decrease in its European net income (SERWER, A, 2015). At the level that McDonald's operates, around 10 000 restaurant spread all over Europe, the financial impact is huge. This shows that consumers are very sensitive to matters that threaten their well-being and that the whole value chain is at risk when similar outbreaks occur. It shows that the financial impact of animal welfare can have fatal consequences for organizations neglecting it which can translate to economic crisis at the industry level. Poor animal welfare practices can also put partnerships at risks among the value chain players. It is common to see retail or restaurant business terminate supplier relationships based on poor animal welfare practices. For example, in early 2015, a restaurant chain, Chipotle, stopped serving pork at its 1700 restaurants because one of its suppliers failed during an internal animal welfare audit (STROMJAN, 2015).

The second risk concerns the moralization of eating meat. Moralization, as defined by Rozin (1999) is "the process through which preferences are converted into values, both in individual lives and at the level of culture". This could divert consumer preference to other food products and threaten the long-term prospect of the animal derived food industry. In fact a study, conducted by Latvala (2012), surveyed 1623 Finish participant regarding their eating habits towards meat. The survey concluded, on one hand, that many participants were planning to either cut the amount or the variety of meat eaten. On the other hand, almost all participants claimed to increase their vegetables consumption. The changes in behavior were due to the current debates about healthiness, sustainability and ethics of meat consumption. This demonstrates how raising concerns, with animal welfare in our society, can drive moralization of eating animal food into decreased animal food consumption. This is why we believe it stands as one of the main risk for the animal derived food industry.

Another risk concerns the cost resulting from new updated animal welfare legislation. As we saw in the previous chapter, concerns in our society can lead to change in animal food consumption but also can bring tighter legislation towards animal welfare. The European

Union (EU) has the most restrictive animal welfare legislation. Although, in general, EU legislation on animal welfare does not require third world countries to adhere (SCHMID; KILCHSPERGER, 2010), the recent legislation trends shows that more and more compliance is required. Companies will incur many different cost as detailed in the "Assessing farmers' cost of compliance with EU legislation in the fields of environment, animal welfare and food safety" (2008) report such as investment and operational cost. The reports also point out the difference between short-term cost and long-term cost demonstrating that immediate investment might be high in the short term but, eventually, going down in the long run. For example, costs sustained in order to prevent soil erosion can increase production and profits in the long run. Brazil, as one of the biggest animal food producer and exporter in the world certainly need to assess this risk in the long run.

On the other hand, good animal welfare policies can help organizations stand out from internal competition and help the industry avoid external competition. As Porter pointed out (2006), when firms connect Corporate Social Responsibility to their strategy it is a source of opportunity, innovation and competitive advantage. We found 3 opportunities rewarding good animal welfare practices. First, we found opportunity for increased revenue and market share then an opportunity for companies to find new financing opportunities (BBFAW, 2015) and finally a reputation increase for organizations and the industry as a whole.

Various studies show that consumers are willing to pay a premium price for animal welfare products (CARLSSON, 2007; NAPOLITANO, 2010; SOUZA 2013). Consumers want to make a conscious consumption choice. This conscious behavior would benefit animal welfare differentiated product to generate increased revenue in the long term for organizations. In fact, previous researches studies show there is a market for differentiated level of animal welfare. Vanhonacker et al (2009) and De Jonge (2014), show that 30% and 50% respectively, of the meat market share consumption, would benefit differentiated level of animal welfare. As of today, the market is mainly divided into conventional product with a low level of animal welfare and organic product with a high level of animal welfare (VANHONACKER et al , 2009). A similar study, by Souza (2015), show that most consumers that have been educated about good and bad animal welfare practices are willing to pay premium prices for meat produced with superior animal welfare practices. In summary this shows that animal welfare product not only give the opportunity to increase revenue but also to gain substential market share against conventional and organic product.

Secondly, we found that animal welfare practices could bring new financing opportunities. The financing needs when company do not have sufficient fund to finance its operations (OPEX) and short and long-term investment (CAPEX) requires them to attract investors. Fortunately, organizations that pursue animal welfare policies could benefit from additional financing opportunities. A report from BBFAW (2015) pointed out that investors are increasingly concerned with animal welfare as they start to see the financial risk and opportunities they represent (BBFAW, 2015). On the equity side, investment companies already take into account animal welfare in their screening process. On the debt side, the Equator Principles (EP), integrate, since 2003, a number of policies for determining, assessing and managing environmental and social risk in project finance. Financial institution, adopting Equator Principles, commit to implement the EP in their internal, environmental and social policies, procedures and standards for financing projects and will not provide project finance or project-related corporate loans to projects where the client will not, or is unable to, comply with the Equator Principles. In the same way, we have seen an increase interest from companies and investors towards bonds that favors environmental, social and governance

benefits (Green and ESG Bonds). These investments opportunities could help organization raise new types of investments lowering their cost of capital.

Finally, past example shows that poor animal welfare can lead to reputation loss. In the early 90's, McDonald's suffered a lot of negative media attention after being exposed, by NGOs, sourcing its eggs with suppliers that were using battery caged production method. Even though animal welfare was not as discussed as today, with no government policies to enforce such rules, McDonald's had to go through decreased revenue and long lasting negative media attention impacting its reputation. Over time, McDonald's has been enforcing tight animal welfare policies and is even considered, today, to be one of the leading organization in animal welfare policies by the yearly business benchmark for animal welfare ranking (BBFAW, 2015). More recently, academic research studied the financial impact of corporate social responsible organization. Empirical studies from Robinson (2011) and Lourenço (2014) demonstrated that firms that have been included in the Dow Jownes Sustainability index (DJSI) would generate increased net income in comparision to similar firms that are not included.

In summary, animal welfare represents both risks and opportunities. The international finance committee (IFC), in a good practice note (IFC, 2014), suggests that higher farm animal welfare standards are likely to win competitive advantage for organizations, through more efficient production processes and increased reputation towards consumers concerned with animal welfare.

RESEARCH METHOD

This study is an exploratory research. No previous academic works analyzing both financial indicators and animal welfare incentives were found.

This part intends to describe the methodology used in this research. First, we present how the sample was created, from the selection of the sources to the creation of the sample. After, we described the sample profile so we have a general overview of the sample main characteristics. Then we discussed how we broke down the sample into different categories that we analyzed against key criteria. This way we did a comparison among key financial indicators, the position in the value chain, the size of the company and their animal welfare practices. Finally, we discussed the limitations of the chosen research method.

In this study, we were interested in companies in the animal derived food industry at any position of its value chain. As described in the previous chapter, companies in the animal derived food industry face risks and opportunities in the way they adopt animal welfare policies. In one hand, animal welfare could pose risks such as public safety, meat moralization or costly legal requirements. In the other hand, animal welfare could open opportunities such as increased revenue and market share, new financing opportunities and reputation increase. The first step was to arrange a sample of companies, spread out in the value chain, that have a propensity to take animal welfare initiatives either because of their leadership role or their exposure to risks. Some sources focuses on animal welfare and sustainability practices by global companies. Other sources focus on company reputation. For this, we chose companies from different sources. This can help us identify how companies deal with animal welfare practices in order to better manage related risks and opportunities.

For these reasons, the sample of companies was composed of six sources that are described thereafter. The companies that compose these sources are publicly or privately owned. Unfortunately, not all information such as financial data or company strategy in terms of

animal welfare practices could be retrieved. Therefore, companies with insufficient available data have been removed. Also, companies that have no activities in the animal derived food industry have been ignored. We can note that some overlaps exist among these sources, which strengthen our belief that our sampling method is consistent. We tried to include food companies from major sustainability index such as ISE (Corporate Sustainability Index in Brazil stock exchange), DJSI (Dow Jones Sustainability Index) and FTSE4GOOD (FTSE Sustainability Index), but unfortunately either they were no food companies included (ISE) or the company list was not a publicly available information at the time of the research (DJSI, FTSE4GOOD).

To compose our final sample, we used sources related to animal welfare ranking, brand ranking and a previous research study related to animal welfare. The sources used were the Business Benchmark on Farm Animal, Oxfam, Interbrand, Global RepTrack, Corporate Knights, and Perin (2012) research study. We used the 2015 version of the rankings, when not available we used the 2014 version. Thereafter we described each of them.

When we combined the companies from our 6 sources we had a brut sample size of 368 entries. In order to only keep only relevant companies for our studies, we applied successive filters. First, we immediately took out 68 duplicates. Then we trimmed out most of the companies that do not interest us by applying an industry based filter. This process allows us to only take into account companies that have activities in the animal derived food industry. In this process, 193 companies have been filtered out of our base sample list. Next, we filtered out food companies that do not have sufficient activities related to the animal derived food industry. In this process, six companies have been filtered out. Lastly we could only consider companies with recent financial information either from 2014 or 2015. In this process, we took out 39 companies. In the end, this left us with a sample total of 62 companies.

Hereafter, we will see the sample distribution profile in functions of its geographic Regions, Value Chain Position and Company Size.

In the sample, 14 different countries were represented. Two main continents were represented with North America (26%) and Europe (64%). We also had companies from Asia (2%) and Latin America (8%). This can be explained by three reasons. First, animal welfare legislation is tighter in these regions. Second, animal welfare NGO's are very active in these regions with strong influencing power via multiple media campaign. Third, historically, companies in these regions are more global.

We define the value chain position as the position where the company has the major part of its activities. In this sample, we used the value chain classification from Deloitte Consulting Group (2013). It defined three different positions in the value chain such as Producers, Processors and Distributors. We do find relevant to add logistic companies in this value chain model, however none exist in our sample.

For the needs of this research, we found relevant to breakdown the distributors category into two distinct sub categories. Retailers and Restaurants are distributors but we wanted to differentiate them since the uniqueness of their business model can bring us relevant insight into our analysis. Thereafter, we described each category.

The Producers' category includes organizations where the majority of its operations lies within the production side of the animal derived food industry such as poultry, beef, and pork farming companies.

The Processors' category includes organizations where the majority of its operations lies in transforming raw food product into marketable food product. It includes companies such as slaughterhouses.

The Restaurants' category includes organizations where the majority of its operations lies in serving immediately consumable food to consumers. This category includes catering companies and fast food chains.

The retailers' category includes organizations where the majority of its operations lies in offering marketable food to consumers.

In our sample, more than half of the sample is represented by the distributors' category with a total of 58%. In terms of proportions, Distributors are very well represented in the animal derived food industry. Processors come in 2nd with 29% of the sample size. Producers, if we compare to the other value chain players, are not as much represented as other players of the value chain, with only 13% present in the sample. With this sample selection, we intend to analyze the capacity of each category to drive animal welfare practices improvements. We may, in part, focus on companies that are in leadership position or exposed to reputation risk. These companies are more likely to adopt and share their sustainability and animal welfare practices.

We believe Company Size will give us additional information for our analysis. Therefore we broke down the sample into size categories depending on the company last annual public revenue (2015). The size categories criteria were defined after preliminary analysis. With companies' revenue ranging from US\$ 400 million to US\$ 500 billion, we decided to divide the sample into 3 groups, Small, Medium and Big. Each categories range was designed in order to be sufficiently represented for further analysis. Up to US\$ 10 billion was classified as a small size company (37% of the sample). Between US\$ 10 billion and US\$ 50 billion was classified as a middle size company (45%). Above US\$ 50 billion was classified as a big size company (18%).

To attain the objective of this study, we analyzed 3 financial indicators: operational performance (operating income over operating revenue); return on invested capital (ROIC - the ratio of net operating profit less adjusted taxes - to invested capital); and long-term debt level (long term debt to total asset), in function of the size of the company, the region and publicly available information related to animal welfare practices.

To elaborate the animal welfare indicator, we used a simplified version of the methodology, created by Perin (2012) that scores companies based on publicly available information such as company annual report, sustainability report or relevant publication online. The simplified approach scores animal welfare practices in function of official statements, operation stance and auditing practices. To score these three categories we used a binary scoring system. 1 when such practices exist, 0 when no such practices have been found.

The financial data have been extracted from the Bloomberg database in March 2016. The figures were all set to be in million US dollar with International Financial Reporting Standards (IFRS). The data were directly imported from an Excel sheet retrieving the corresponding information from the following data field of Bloomberg database:

The Qualitative data have been extracted either from the company annual/sustainability report or from their official website. The qualitative analysis converted the information retrieved from these report into a nominal scale: "0" meaning no information on the topic and "1" meaning some information exists on the topic. We looked into 3 categories such as general policies, operating processes, and audit in animal welfare practices.

After retrieving all the financial and qualitative data, we grouped and analyzed the information into the following categories: value chain positions; geographic regions; and company sizes

In each of these categories, we calculated descriptive statistics of the different indicators and analyzed both financial and qualitative data, uncovering possible risks and opportunities for

animal welfare in the animal derived food industry. Then, we used a statistic test to assess the level of significance of the observed results.

Our observations contain continuous data from different independent groups within the value chain position, the regions of origin and the company sizes. Since there are more than 2 independent groups, a relatively low sample size and a distribution without defined probabilities, we used the Kruskal–Wallis statistical test (SIEGEL; CASTELLAN, 2006). We worked with a level of significance (α) of 5% on the following hypothesis:

H_0: There are no differences among independent categories

H_1: There are differences among independent categories

The statistical test results were obtained using Stat Tools 7.0 (Palisade Corporation).

RESULTS

Table 1 shows the average of financial indicators depending on the company's position in the value chain.

Table 1: Financial indicators in the value chain

Average (%)	OM 2015	ROIC 2015	LTD/A 2015
Producers	7,97 (6)	9,63 (6)	**57,09 (8)**
Processors	9,53 (13)	9,64 (13)	18,20 (11)
Restaurants	**12,51 (16)**	**16,51 (16)**	27,20 (16)
Retailers	3,20 (19)	7,47 (18)	31,20 (18)

Out of the players in the value chain, Restaurants appears to be in the best position to include in its product line new products related to improved animal welfare practices.

Retailers have the lowest OM. This shows that Retailers do not have enough operating efficiency to reshuffle their product portfolio with animal welfare products. Producers and Processors do have a better operating efficiency than Retailer.

ROIC indicates the company's capacity to monitor short, medium and long-term performance while animal welfare innovations are adopted in different part of the value chain. For instance, Producers, Processors and Retailers have a high single digit ROIC while Restaurants almost double their ROIC value. it appears that Restaurants have much better financial efficiencies to implement improved animal welfare practices in the animal derived food industry.

In terms of innovation and capex investments, we notice that Producers have the least favorable position. Their high debt to total asset ratio implies possible difficulties in raising new debt thus limiting their capabilities for innovation and capex investments in enhanced animal welfare practices. In this regards, other players of the value chain have much better capabilities to improve animal welfare practices in their operations such as Processors, Restaurants and Retailers.

In all, it appears that Restaurants are better positioned than any other players of the value chain to improve animal welfare practices in the animal derived food industry. They have better capabilities to innovate and include new improved animal welfare products into their product portfolio, increase capex thanks to their investments capabilities and follow up, short and long term development thanks to their financial efficiency.

Table 2 shows the average of financial indicators depending on the company geographic Regions. To better understand the results shown in Table 2 we present the value chain distribution of companies per region in table 3.

Table 2: Financial indicators per Regions

Average (%)	OM 2015	ROIC 2015	LTD/A 2015
Asia	7,10 (1)	9,54 (1)	31,88 (1)
Europe	5,96 (33)	8,58 (32)	28,02 (33)
N.America	**12,73 (15)**	**17,34 (15)**	24,48 (14)
S.America	7,60 (5)	7,51 (5)	**70,91 (5)**

Table 3: Value chain distribution per Regions

	Producers	Processors	Restaurants	Retailers	Grand Total
Asia	100%	0%	0%	0%	100%
Europe	10%	23%	28%	40%	100%
N.America	6%	25%	44%	25%	100%
S.America	60%	20%	0%	20%	100%

In Table 2, out of the players per geographic regions, North America, appears to be the region in the best position to lead improvement in animal welfare practices. Here we assume that the value chain distribution highly impact the financial metrics per region. Table 3 shows that North America has a greater proportion of Restaurants. As we saw in the previous section Restaurants have a better OM, ROIC and less LTD/A than any other players in the value chain. Nevertheless, this could be an opportunity for stakeholders such as NGOs or regulators to engage with a specific set of companies in their region. Indeed the average OM shows room to maneuver for companies in the region to reshuffle their product portfolio including more improved animal welfare product. Their high ROIC allows to monitor short term and long-term implementation of new animal welfare practices. Finally, the low LTD/A also shows that companies in the North American regions can invest capex into animal welfare improvement by raising new debt.

Table 4 shows the average of financial indicators depending on company sizes. To better understand the results shown in table 9 we present the distribution of companies per Company Size in table 5.

Table 4: Financial Indicators per Company Size

Average (%)	OM 2015	ROIC 2015	LTD/A 2015
Big	4,32 (10)	6,39 (10)	29,33 (9)
Medium	8,23 (26)	11,40 (26)	**35,88 (27)**
Small	**9,75 (18)**	**13,02 (17)**	26,26 (23)

Table 5 Value chain distribution per Company Size

Sector	Producers	Processors	Restaurants	Retailers	Grand Total
Big	0%	30%	0%	70%	100%
Medium	11%	29%	21%	39%	100%
Small	25%	13%	50%	13%	100%

In table 4, out of the players per company size, Small companies, appears to be the in the best position to lead improvement in animal welfare practices. Again, we assume that the value chain distribution highly impact the financial metrics per company size. Table 5 shows that Small companies have a greater proportion of Restaurants. As we saw in the previous section Restaurants have a better OM, ROIC and less LTD/A than any other players in the value chain. In one hand, this could mean that small cap companies may have more opportunities to implement improved animal welfare practices. Indeed they benefit from operation efficiency meaning room to launch new product with improved animal welfare. They can raise more debt if they need to increase their capex related to improve animal welfare practices. They also have a better ROIC, allowing to monitor short and long term changes of improved animal welfare practices. In the other hand, we see that big companies, essentially constituted of Retailers have low OM and ROIC, meaning lower capabilities to lead animal welfare practices. This result can help stakeholders better engage with companies in function of their position in the value chain, their geographic region and their size around animal welfare improvements.

It is interesting to note, looking at the previous table 1, 2 and 4, that two opposite interpretations could be made. Is it because companies have too much financial resources that they can invest in improved animal welfare practices? Or is it because they do not invest in animal welfare practices that their financial indicators are much better? Our intuitions is that the level of discrepancies among financial ratios is too high to explain that companies investing in improved animal welfare practices have much lower financial ratios. We believe that investment in improved animal welfare practices should not represent more than a few basis point of these financial indicators.

Animal welfare practices are scored on 3 categories such as official statements, operation stance and auditing practices. Scoring is based on a binary scoring system. 1 when such practices exist, 0 when no such practices have been found. For a more common understanding of the result we translated the average of this number in percentage. Table 6 shows the average of animal welfare practices depending on the position in the value chain.

Table 6: Animal welfare incentive by position in the value chain

Average (%)	Official statement	Operation	Auditing
Producers	78	78	78
Processors	79	79	71
Restaurants	50	50	50
Retailers	**90**	**86**	**86**

Table 6 shows that Retailers are more committed than other players in the value chain in communicating animal welfare practices and implementing them in their day-to-day operations. Producers and Processors also show a high level of animal welfare commitment. Restaurants appears to have the lowest commitment in animal welfare practices among all players. Apparently, players at the top of the value chain, close to animal contacts seems to be more concerned by enhanced animal welfare practices. Retailers differently to Restaurants show high level of concerns as well.

Table 7 shows the average of animal welfare practices depending on geographic regions.

Table 7: Animal welfare incentives per region

Average (%)	Official statement	Operation	Auditing
Asia	100	100	100
Europe	78	75	73
N.America	63	63	63
S.America	**80**	**80**	**80**

Table 7 shows Asia with the highest score in all 3 categories. Unfortunately, we had to discard this result since only 1 company from Asia was analyzed in this sample. On the contrary, other Regions gather bigger sample quantity. We can say that Europe and South America are more committed than any other region in communicating animal welfare practices, implementing them in their day-to-day operations and having auditing processes. Also, North America appears to be last in class with the lowest animal welfare within its group.

Table 8 shows the average of animal welfare practices depending on company sizes.

Table 8: Animal welfare incentives per Company Size

Average (%)	Official statement	Operation	Auditing
Big	**90**	80	**80**
Medium	82	**82**	79
Small	58	58	58

Table 8 shows that Big and Medium companies are more committed than any other Company Size in communicating, implementing and auditing animal welfare practices. Small companies have the biggest room for improvements. They are lagging way behind their counterparts in terms of animal welfare.

Table 9 shows the statistical results obtained. Its reliability could be improved with better sampling method and increased data number per categories. Therefore, we must be cautious about its results. We focus on discussing the implications when H_0 is rejected.

Table 9: Kruskal-Wallis test

KW test (α) of 5%	OM	ROIC	LTD/A
Value Chain position	Reject	Don't Reject	Don't Reject
Geographic Region	Reject	Don't Reject	Don't Reject
Company Size	Don't Reject	Don't Reject	Don't Reject

The statistical test for the OM indicator of the Value Chain position category rejects H_0. This mean company position in the value chain do have an impact on the OM. Going further, we applied the Mann-Whitney U Test with the Bonferroni correction to know which category stand out. The result shows that Restaurant is the category that differ the most.

The statistical test for the OM indicator of the geographic Region category rejects H_0. This means that Regions may have an impact on the OM ratio. However, we believe that the value chain position distribution per region affects directly our results. To be more conclusive it would be interesting to test the correlation of the Region category and the position in the value chain category with the OM results. The same argument holds true for the Company Size results.

Our analysis per value chain Position, Regions and Company Sizes and animal welfare incentives shows interesting results. In the value chain, Restaurants have the best financial ratios among other players. It shows that they have better capabilities to drive animal welfare initiatives. Other value chain players such as Farmers and Slaughterhouses, with fewer capabilities, often face strong pressure and criticism among value chain players. The contradiction shows that Industry players with limited resources have much better animal welfare practices than players such as Restaurants with higher capabilities. Since Restaurants have better capabilities than any other companies do, it is an opportunity for them to lead animal welfare practices in the animal derived food industry by developing a value chain strategy that take advantage of new opportunities, drive innovations and mitigate risks.

Our analysis per Region shows that North American companies have the highest OM, ROIC ratios and the lowest LTD/A. Although future studies can confirm these results, we can say, now, that North American companies have more capabilities than other region to adopt improved animal welfare practices and to face tighter regulation. Regulators could consider this and improve current animal welfare legislation.

Our analysis per Company Sizes shows that Small companies have the highest OM, ROIC ratios and the lowest LTD/A. Similar to the Region analysis; it shows that Small companies have more capabilities than other Region to adopt improved animal welfare practices and to face tighter regulation.

CONCLUSION

Animal welfare is a major raising concern for the animal derived food industry. Recurring media attention, increased consumer awareness and tighter regulations makes it one of the leading topic of interest in the animal derived food industry. It is often seen as a strategic business issue.

Controlling risks and taking advantages of opportunities related to animal welfare practices will not only benefit precursors but will also benefit the long term outlook of the animal derived food industry. The preceding quantitative and qualitative analysis showed us some discrepancies among value chain player. Although risks and opportunities are similar for all players, their financial performances are strikingly uneven. Unfortunately, strong expectation and intense pressure are held on players with the weakest financial ratios. For example, Producers have the lowest OM and the highest debt leverage but we still expect them to resolve all these issues on their own. This complicated situation combined with the risk and the cost to bring new products and processes to the market gives them very little room to maneuver and to improve their animal welfare practices. Some industry players with much higher financial performances could work together, within an integrated value chain strategy, along with other players, improving animal welfare practices in the animal derived food industry. Indeed risks and opportunities, around good animal welfare practices, remain at the industry level. Developing an integrated strategy involving all stakeholders could benefit the industry in the long term. Of course, an involvement, with efforts and investment, needs to come evenly from all player of the value chain. Each player has different capabilities to participate in creating a process of sustainable animal welfare practices throughout the industry. For Example, an integrated strategy would see producing, transporting and processing food companies invest resources to improve infrastructures, technologies and processes while other stakeholders invests resources in auditing, communicating and promoting animal welfare improvements. As Porter (2006) pointed out, when firms connect

Corporate Social Responsibility to their strategy it is a source of opportunity, innovation and competitive advantage. In other words, players of the animal derived food industry can take integrated animal welfare initiatives and be rewarded or wait facing competitive risks or new regulations.

The benefit to develop an integrated strategy in the value chain rather than waiting for better regulations is multiple. On one hand, it can increase market share and revenue, give new financing options and increase brand reputation. On the other hand, it can mitigate risks such as public safety, meat moralization and costly legal requirements. On top of that it will develop valuable skills in sustainable food practices in the value chain that can be used on other product line. Eventually, sharing an integrated strategy will benefit all stakeholders and create long lasting business relationships.

In practice, when elaborating an integrated strategy, as A4S recommends, companies should agree on valuation models that monetize CSR practices in terms of financial values to companies and shareholders, or societal values integrating the animal derived food industry specificities. The benefits are twofold. First, it will bring better understanding on the resources commitment and the added financial value that each player bring to the table, thus avoiding conflicts among value chain players. Secondly, it will give CFO's additional tools to increase company valuation and more accurate net present values in project valuation.

In consequence, we believe, the results shown in this exploratory shows that an integrated value chain strategy path the way to improved animal welfare practices benefiting all stakeholders, from businesses to consumers, and guarantying a positive sustainable outlook for the animal derived food industry.

Additional studies could go further by looking at financial improvements made by companies sharing an integrated animal welfare strategy among the value chain. It would also be of interest to take into account the risk factors of different business models in similar studies.

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