Comments on the proposed Australian Animal Welfare Standards and Guidelines for Poultry and the Consultation Regulation Impact Statement (RIS)

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Summary

The list of advantages and disadvantages for the housing systems suffers from inaccuracies, simplification and occasionally is factually questionable. The public benefits aspects (food safety, environment, WHS, antibiotic use) are inadequately or erroneously covered. The importance of the interactions between, flock size, disease and management is overlooked.

The approach to welfare risks should be guided by justifications to the imposition of risks and the ability to mitigate the risks, completely or partially. Objective variables such as the number of birds exposed, duration, the level of certainty of the adverse effect and the strength of the scientific data are an important element in the decision process. Not all of these variables were included in the RIS which makes it difficult to assess the hierarchy of the welfare risks listed in Table 14.2. Nevertheless, it is apparent that the lack of freedom of poultry to express their full repertoire of behaviours in conventional cages (CC) imposes a scientifically recognised, nationally and internationally accepted welfare risk of very long duration and of absolute certainty. The perches, nests and litter are a partial mitigating solution and should not be listed as risk areas for all hens since predominantly they serve to mitigate the lack of freedom in cages rather than enrichment for hens on litter where current practices already include nests in all and litter in most non-cage hen housings. Trade-offs between freedom versus adverse welfare impacts from other causes (e.g. pecking, cannibalism, disease etc.) that are evident in barn and outdoor housing have not been recognised in furnished cages (FC) that offer higher level of freedom than CC. If mortality, production, diseases, predators and cannibalism are deemed to be a significant welfare issues, FC either under option D or F should be preferable to CC as it meets higher welfare standards. In this circumstance the justification to continue keeping hens in cages is dubious. Should the CC prevail, a significant welfare risk is the current stocking density in conventional cages that can't meet recognised behavioural needs of hens. The variables mentioned above need to be carefully assessed for other welfare risks on the list, albeit some have already been included in the S&G before the feedback from the community.

The accuracy of estimates of costings in the RIS based on requirements for additional hens and land/facilities for various options is dependent on the accuracy of inputs such as mortality. Data is provided that demonstrate that the comparative mortality figures used in the RIS are significantly higher than figures available from reliable Australian and international data. Therefore, the accuracy of the costings presented in the RIS is questionable. RIS estimates of a 2% hen replacement requirement for furnished cages are also likely to be inaccurate.

The outcome under Options D or F is practically identical because both propose to replace the conventional cages and allow a voluntary choice between FC and the other 2 housing systems. Cost wise both are similar. Option D addresses exclusively layers in cages and option F predominantly also hens in cages. The minimum spatial allowance that is recognised internationally - 750 cm^2/hen, is deemed the most appropriate but the RIS apparently neglects this aspect. A time frame of 10 years (option F) is reasonable.

Routine second beak trimming after 10 days of age could be associated with significant welfare consequences and possibly reflects incorrect initial infra-red beak trimming. Exceptional circumstances may exist to justify a second procedure but the logistics need careful evaluations. Option G (without banning pinioning) is supported.

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Background

These comments are made in response to the proposed Australian Animal Welfare Standards and Guidelines (S&G) for Poultry November 2017 and the Regulation Impact Statement (RIS) that was aimed to facilitate public consultation.

I am a poultry veterinarian with more than 36 years' experience in the poultry industry. During these years I provided and participated in diagnostic field service, emergency disease investigations and control, Salmonella Accreditation programs, RIRDC field based research and joint investigations with the NSW Food Authority. I visited numerous poultry enterprises in NSW (still visiting) and have a firsthand knowledge of many of the welfare aspects that are up for discussion.

I am also consulting to producers seeking to enrol free range flocks in the RSPCA accreditation program for layers. This gives me opportunities to examine mortality and production records. I have good knowledge of what can be achieved through good management to monitor and mitigate feather pecking, cannibalism and predation.

1. Expectations from an RIS

No single document could do justice to the complexity and extensive scientific data that prevails in the animal welfare field. The complexity of the housing systems is also significant and not easily amenable to generalisations. However, a Regulation Impact Statement (RIS) should strive for balance and accuracy. Otherwise, the public consultation process is significantly compromised. It should also rely on a vigorous scientific review and provide the community with sufficient tools to form opinions. When the community is asked to comment on options such as the furnished cages, it is regrettable that furnished and conventional cages were amalgamated into one group when it is abundantly clear that differences between the two were reported in the scientific literature. Generally, the list of advantages and disadvantages for the housing systems suffers from significant inaccuracies, simplification and occasionally is factually questionable. Significant elements of costings such as additional land, additional hens and facilities are also dubious since the inputs used for the estimates are questionable. Other concerns are assumptions that are not applicable to micro and small flocks, not considering surplus eggs and ignoring the land elasticity of many free range farms now that permitted stocking on the range has been raised 7x the previous range stocking density.

2. Public benefits

The RIS claimed that the basis of the selection of a preferred option is that it is the one that generates the greatest net benefit for the community. While the financial impact on the industry and pricing margins were estimated, little else that is relevant to community benefits was explored. A number of pros and cons listed for different housing systems appear to be guided by perception rather than data and none is more important than erroneously claiming that a higher level food safety is associated with the cage system.

2.1 Food safety Holt et al (2011) in a comprehensive review concluded that there is no general consensus on the food safety superiority of one housing situation over

another. More recent Australian studies indicated that fewer free range (FR) flocks than indoor flocks were found to harbour Salmonella (Cuttel et al 2014, NSWFA 2013, Safe Food Qld 2015). Jones et al. (2016) detected significantly higher proportion (95%) of CC hens testing positive for *Campylobacter* compared with FCs (91%) and non-cage (85%) birds housed on the same research farm. Another study (Van Hoorebeke et al., 2010) sampled a total of 292 commercial laying hen farms in Belgium, Germany, Greece, Italy and Switzerland and identified conventional cage housing as a specific risk factor ($p < 0.02$) for Salmonella shedding. Messens et al (2007) reported higher penetration by Salmonella of cage eggs (16%) than free range eggs (6%) at 14 days storage time.

2.2 Environmental benefits

One environmental aspect - higher nutrient run off from free range farming, was listed as a disadvantage but little else was provided on environmental impacts such as dust, noise and odour on neighbours, the carbon foot print, or indeed, the beneficial effects of poultry free range systems on utilisation of grain belt paddocks/orchards and the control of weeds (*Glatz et al 2004*). The run-off aspect attributed to FR operations is an oversimplification laced with suppositions. Any run-off would depend on topography, catchment area, type of ventilation, shed foundation, distribution of birds on the range and other management strategies. RIRDC report (2015) eluded to the lack of data on the environmental impacts of free range farms. It concluded that "*nutrient concentrations in the range soils were, in general, found to be slightly higher than the control areas in nitrogen and ammonium concentrations, and slightly lower in phosphorus concentrations. No evidence was found of a relationship between number of years of free range operation and amount of nutrient build-up in the subsoil, meaning the concentrations of nutrients deeper in the soil was not increased by the amount of time the farm had been operating*".

The RIRDC report concluded that the majority of the nutrients on the free range farms were reported to be captured on the range during short, intense, infrequent storm events.

Additionally, odour emissions from free range sheds in the case study were found to be comparable to odour emissions measured from conventional style sheds. The report stated that *"finally, when the whole-of-range odour emission rates are compared against the shed odour emissions, it becomes clear that emissions from the range area are virtually of no consequence".* The report also stated that *"while the pop-hole exits may have the highest odour emission rate per unit of area, these areas take up such a small percentage (about 1%) of the whole range, that the contribution of the pop-hole exits to a whole-of-range odour emission rate is minimal".*

2.3 Antibiotic use

Lower antibiotic usage was listed in favour of the cage system but the impact on the community of development of drug resistance was not explored. Studies indicate that the emergence of resistance is not a mere function of usage and Australian studies (Obeng et al 2012) concluded that resistance to Bacitracin, Ceftiofur, Erythromycin, Lincomycin, Tylosin and Tetracycline was more common among meat chickens (free range and intensive) than free range egg layers ($P<0.05$). If usage was the primary factor, one would not expect FR layers with the RIS claimed "frequent" Antibiotic

use" to be trailing meat birds where usage is claimed to be restricted and controlled. Other studies indicated a higher level of antibiotic resistant bacteria in caged hens (Ojeniyi et al 1985). The AVA (2017) list of antibiotic usage in the layer sector should attest to the very limited ability to use first, second and third line antibiotics on layers be they FR/barn or cage flocks.

2.4 WHS (Work Health Safety)

Another possible area with human health implications is the WHS aspects in different systems. The RIS listed higher levels of dust in non-cage systems, however, a less than a complete picture was presented and in this respect it should also be considered that no data were presented comparing CC to FC. NZ studies (2010) indicated lower dust levels in FC than CC although the differences were not significant. Studies also indicated that while dust levels were higher in litter systems, greater respiratory dysfunction was reported among workers in cage housing (Just et al 2009). WHS issues associated with "staff bending down to collect eggs" were listed in the RIS in the context of the litter systems but dealing with various tasks requiring attention, including bird observation and mortality pick-ups in multi-tier cage systems and especially the bottom tier was not mentioned. The comparative potential for exposure to zoonotic infections in different housing systems is not addressed. WHS aspects should be approached systematically and thoroughly rather than off the cuff superficial comparison that is evident in the RIS.

3. Management

The role of management is indeed important regardless of the production system but stockmanship is a critical aspect of free range production and it should be recognised that many significant industry players are inclined to view free range simplistically as a mere extension of a barn housing with the provision of popholes and some additional fencing rather than acknowledging the complexity of the system or seeking innovative solutions and striving to realise its potential. In the UK, Prof Nicol stated that "*it would be nice to think that the free-range system currently gave birds the best welfare. The problem is that the management of free range systems in the UK at the moment is so variable, that although you get some brilliant farms, you also get some that are really, really not good."* (BBC Nov 2013)

The interactions between welfare and management as well as emergency disease risk are also influenced by flock size (Appendix 2) and this aspect was largely ignored. The RIS estimates 35,953 hens to be the average farm capacity of free range farms and defines micro farms as farms with up to 5000 hens. However, the bulk of free range farms in Australia would be micro farms that would be represented better by a median than by an average that is a result of a few free range farms with more than 100,000 birds. The presence of a large number of micro farms is also likely to reduce the risk of HPAI as the smallest flock ever reported with HPAI in Australia was a 17,000 hen farm. Costings of eradication and risk of spread would also diminish considering that the majority of FR flocks in Australia are micro flocks. Furthermore, the incidence of cannibalism and severe feather packing is influenced by flock size (Bestman et al 2003).

4. Hierarchy of welfare risks

The public was asked to prioritise the welfare risks but was given insufficient tools.

The main areas of welfare risk listed in the RIS (Table 14.2) were:

- Lack of clear responsibilities for personnel in charge of poultry;
- Lack of freedom of poultry to express innate behaviours;
- Inadequate space allowances for poultry (stocking density);
- Lack of perches, nests and litter for layer hens (production systems);
- Lack of quantitative lighting standards;
- Need for restrictions on routine beak trimming;
- Risky litter management;
- Need to restrict routine use of induced moulting;
- Care of meat chickens and turkeys awaiting slaughtering; and
- Access to water for ducks.

A. The need for **clear management responsibility** is listed among 10 other risk areas that the public is being asked to prioritise. However, although management responsibility is an important aspect it is not possible to decide which comes first, the standards or the management (similar to chickens and eggs). Management needs clear standards and guidelines and the S&G need clear indications of responsibility in order to be effective.

B. **Duration** The RIS stated that *"as we cannot objectively measure the impact on individual animals, because the adverse impacts in question are largely mental rather than physical, a specific public consultation question has been asked".* On this basis it can be assumed that a value judgement would be involved" in community response.

Nevertheless, a value judgement by the community may also seek a rationale and justifications for imposing or addressing welfare risks. It also would be guided by the availability of mitigation strategies. Probably less by scientific justifications and more by other variables such as the number of animals exposed to the risk, the duration of the risk and its certainty. Ultimately mental impacts on animals cannot be quantified in anything other than subjective or individual terms. Therefore, judgements in response to the 10 areas of welfare risk are likely to be subjective. This is a good reason to try to try to introduce, wherever possible, all available objective variables.

The RIS recognised that "*simply providing information on the number of animals affected does not provide any information regarding the duration of the effect nor the impact of the effect on each animal".* However, Part 4.2.1 states that in the absence of any ability to quantify the impacts on individual animals, the number of animals affected is used as a rough proxy of the quantitative animal welfare impacts of different options. The impacts are summarised in Table 49.1 and clearly do not include a 'duration' component (i.e. brief or long lasting). As a result the judgement on welfare risks could be impaired. Exploring the numbers, as for example in the case of the care of meat chickens and turkeys awaiting slaughtering (29.7 million/annum) would invariably lead to this risk being placed ahead of behavioural needs of hens that affects 10.7 million birds. However, once duration of the impact is included, the choice is between an impact that affects more birds for a very brief period and an impact that affects fewer birds but for the duration of their life.

C. **Degree of certainty.** There is also the element of the degree of certainty that a negative impact would occur. For example, prohibiting the removal of more than 1/3 of the beak would not result in feather pecking in all the 20,684,550 layers subject to the procedure but only in 9% of the birds (RIS Table 49.1). However, it is a certainty that all 10.7 million birds in conventional cages would be affected by the lack of freedom to express innate behaviour. Similarly, restrictions on the length of the beak that can be trimmed could lead to cannibalism and predation that would affect only a proportion of the free range flock but there is certainty that lack of freedom to express scientifically recognised behavioural needs would affect every single hen in conventional cages for the duration of their life.

D. Perches, litter and nests. The RIS includes lack of perches, nests and litter for layer hens (cages and litter) as a risk area. However, the perches, nests and litter are a partial mitigating solution to address behavioural restrictions in conventional cages and their absence should not be listed as risk areas since predominantly they serve to mitigate the lack of freedom in cages rather than enrichment for hens on litter where current practices already include nests in all and litter in most non cage hen housing. Whether perches are required and could be justified on scientific grounds is unclear as the scientific evidence is deemed to be intermediate or equivocal. Nevertheless, their presence gives the conventional cage additional vertical space and opportunity for more behavioural expressions than the CC, less aggression and ability to stretch the wings.

E. The other welfare risks listed are

1. Lack of quantitative lighting standards;
2. Need to restrict routine use of induced moulting
3. Need for restrictions on routine beak trimming;
4. Inadequate space allowance for poultry (stocking density)
5. Access to water for ducks

E.1- Lighting affects daily, all poultry in indoor environments, including also free range for a considerable number of hours (covered in the S&G by SA6.1 – SA6.5). It may have more chronic impact than other risks which would make it less visible but nevertheless an important welfare aspect.

E. 2 – (induced moulting) Point number 2 involves a relatively small number of birds (2.95 million). The rationale to justify the restriction on routine use of induced moulting may be questioned when the procedure is reported to be practiced by 15% of the industry. The duration is short and the likelihood of adverse effects is medium (may or may not eventuate). The need to reduce moulting fits into the low or medium welfare risk category. Restrictions on induced moulting are already proposed in the Standards and Guidelines (SA9.4, SA9.5 and SA9.6) regardless of consultation outcomes. There could be practical justifications for induced moulting and overall this is nor regarded as a significant welfare risk area.

E.3 - Routine beak trimming (see Other Options section Option G, page 16)

E.4 On the stocking density issue

While the strength of the scientific data regarding the optimal stocking density for birds on litter is equivocal, there is sufficient body of scientific data to indicate that the current space allowance for hens in conventional cages is insufficient. Hens in small size cages (typical of many conventional cages), are effectively prevented from performing even simple locomotor and comfort movements. Nicol et al (2017) reported studies by Dawkins and Hardie with the following ranges of space; to turn around (540 to 1,006 cm2), stretch wings (653 to 1,118 cm2), wing flap (860 to 1,980 cm2), preen (814 to 1,270 cm2), and ground scratch (540 to 1,005 cm2). A video kinetic study (Mench and Blatchford 2014 cited in Nicol et al 2017) determined the space required by hens to stand (563 cm2), turn around (1,315 cm2), lie down (318 cm2), and wing flap (1,693 cm^2). The literature on the effects of space allowance in layer cages shows that in general as floor space decreases, within a range of 650 to 300cm^2 per hen, bird welfare generally decreases, as measured by either higher mortality, lower egg production and body weight or poorer feed conversion (Widowskiet al. 2016). The current space allowance of 550cm^2 falls within the range that was identified to impact on bird welfare. The limited space in conventional cages is unacceptable in view of bird welfare (LayWel, 2006)

This is a significant welfare risk that should be addressed, especially if the current conventional cage system prevails.

E.5 Access of ducks to water Access to water for ducks affects all ducks in indoor housing (Covered in the S&G). This has been included in the S&G (SB 4.4) regardless of the outcome of the public consultation.

Care of chickens and turkeys at slaughter establishments

Discussed under B. It is apparent that the care of chicken and turkeys at processing is of a very short duration and the welfare risk is low although public visibility could be high. Regardless of public consultation outcome this area is covered by SA11.1-SA11.8.,

Litter management – A significant welfare risk area that is already covered by the Standards (SA8.1 –SA83)

5. Hen replacement, egg shortfall and housing requirements as a result of various options

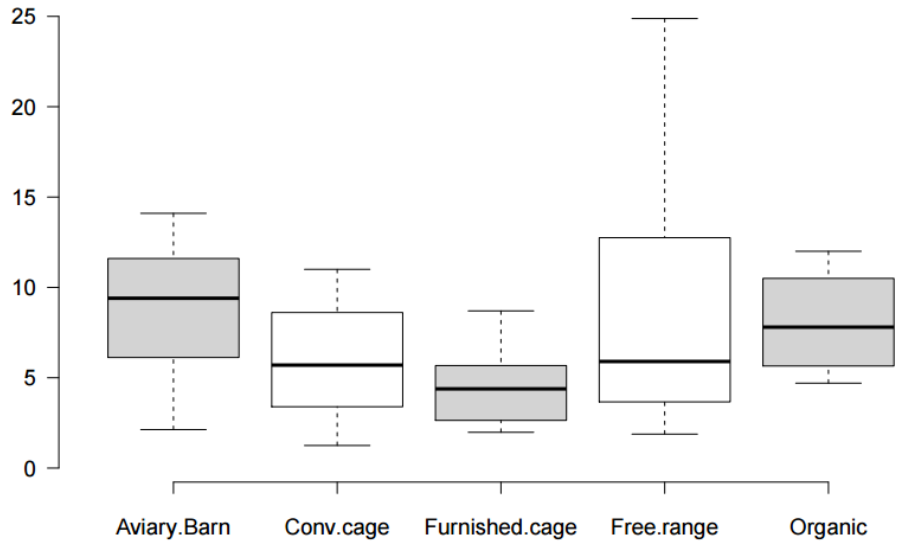
Financial estimates such as replacement pullets and additional housing capacity and land are guided in the RIS by the difference in mortality, egg production and hen capacity between different housing systems. However, the accuracy of these estimates depends on the accuracy of the comparative mortality figures for the different housing systems. The differential impacts on different size businesses is also estimated. This would also depend on the consistency between the definition of small business and flock/farm size. A small business is defined to be one with fewer than 20 FTE and a small farm is considered to be a flock with 5000 - 100,000 hens. A large farm is considered to be a farm with more than 500,000 hens but due to automation even a 1,000,000 hen flock can operate with fewer than 20 FTE and be considered a small business. The incremental costs of various options calculated for different business sizes do not reflect the farm gross or net income and ability to

absorb additional costs. Additionally, the proportional impact on individual farms would be influenced by the total number of farms in each category (small, medium and large). There is a significant discrepancy between the Industry supplied data of 337 hen farms (199 FR, 50 barn and 88 cage) and the data that is provided in ABS (2017); 1,539 FR, 159 barns and 130 caged farming businesses. If, as the ABS (2017) data suggest, there are more hen farming businesses than the data provided by Industry to the RIS, the calculations in the RIS would be inaccurate. The inconsistency between ABS data and the data adopted by the RIS may explain the oversupply problems that affect the industry and in particular cage eggs (SMH 2014, Canberra Times 2017). This element was not considered by the RIS when estimating the need for replacement hens.

Also, the RIS assumed higher requirements for replacement stock and land as a result of increased proportion of free range hens but ignores the significant elasticity available in the free range sector now that the free range definition has been changed to 10,000 hens per hectare. Furthermore, since most FR flocks fall into the small and micro size farms, the financial impact as a result of banning conventional cages or investing in furnished cages is barely applicable to most small and all micro size flocks as they are not cage farms.

6. Mortality

There is data to indicate lower mortality in conventional cages (CC) than in in outdoor and barn housing. However, there is also data that supports consistently lower mortality in furnished cages compared with CC (Nicol et al 2017, Lay et al 2011).



(Comparative levels of mortality (%) in each housing system (Nicol et al 2017)
The unweighted mean of 23 studies reported 5.7%, **4.5%,** 8.7%, 9.4% and 8.1% in CC**, FC**, non-cage, FR and organic respectively.

Therefore, if mortality, diseases and cannibalism are deemed to be significant welfare issues, furnished cages (FC) should be supported in lieu of conventional cages when there is little doubt that FC enable a wider repertoire of hen behaviour.

The comparative mortality data used by the RIS (12%, 8% and 4% for FR, barn and cages respectively is at odds with large independent Australian studies and published overseas studies.

Australian large scale comparative trials on 32 farms and 1,000,000 birds indicated a much more modest comparative difference between FR and cage hens (1.81% cages vs 2.8% FR) than that supplied by AECL. http://www.animalwelfare.net.au/comm/download/Poultry%20Welfare%20Presentations.pdf.

Similarly, extensive European studies (LayWel 2006) reported a difference in mortality of only **3.5%** between cages and alternative systems; 8.3% - cages, 7.1% FC (small cages) and 11.8%-alternative systems compared with AECL data of **8%** difference.

Mean levels of on farm mortality during the laying period, for a total of 1,486 flocks in Great Britain, were reported (Week 2012) to be 5.39% (cages) 8.55% barn and 9.52% (free range). The difference in mortality between cage and free range flocks (4.13%) is half the mortality used in the RIS estimates.

The accuracy of the comparative mortality figures is a critical component with a significant impact on replacement pullet requirements, additional land, etc. and therefore, a very likely impact on the accuracy of costing figures.

In the Australian studies Infrared beak trimming was used optimally and in the words of the researchers “prevented beak regrowth and subsequent cannibalism”. European LayWel (2006) project reported significant differences in end of lay mortality according to breed and beak-trimming status. Singh et al (2015) reported that 50% of free range farms did not beak trim their hens - another reason to be careful when using industry data without the ability to fully understand the characterisation and practices on each of the farms. On the basis of the independent research and other studies mentioned above, it can be assumed that when optimal beak trimming techniques and methodology are used, the mortality estimated in the RIS and on which the costings are based is likely to be much lower.

The assertion in the RIS that the cage hens suffer the “lowest incidence of disease because of highest level of biosecurity and easiest system to control disease by isolation” is highly questionable especially when it is considered that diseases are not necessarily infectious and additionally, biosecurity in barns is capable of reaching the same biosecurity standards as cages. Recent studies reported 56% presence of wild birds in cage and barn flocks and 52% in free range barns (Scott et al 2016). This does not illustrate a higher level of biosecurity in cages compared with barn or indeed free range flocks.

Levels of mortality in laying flocks may vary considerably between flocks, beak trimming practices, systems and bird genotypes and are also partly dependent on the length of production cycle (longer in many FR flocks).

Causes of mortality
There is a need to distinguish between causes of mortality from infectious **agents** and those from other causes, for example, egg peritonitis with almost double reported mortality in cage birds compared with FR (Morrison 2011). Causes of mortality from infectious agents were reported (Fossum et al., 2009) to vary between different housing systems with higher vulnerability to viral diseases in cage hens than the FR systems (30% vs 4.4% in FR). Even when bacterial diseases were considered, the cage hen still faced a significant risk with 65% of mortality being caused by bacterial infection. The mortality data below is not necessarily applicable to Australia and as the authors indicated, represent a unique period in one country.

Causes of mortality in hens submitted for routine necropsy in Sweden (2001-2004) (Fossum et al., 2009)

Housing system	**Bacterial diseases %**	**Viral diseases %**	**Parasitic %**	**Cannibalism %**
Cages (conventional and furnished)	65	30	10	5
Non-cage	73	11.6	18	19
Free-range	74	4.4	22	26

UK VDL autopsy results for the period 1995-2010 cited in Morrisons (2011) reported much higher egg peritonitis, septicaemia, salpingitis, air-saculitis, ILT and starved out in hens in cages than barn or free range. Unfortunately it is difficult to find similar Australian data although RIRDC studies (Nolan et al 2001) reported high mortality from cannibalism in cage birds.

It should be considered that the lower level of some infectious diseases in cages could be more a function of availability of all the required vaccines, a process that has taken more than 40 years to be accomplished. I encountered daily disease issues in cage flocks in NSW between 1980 and mid-2000, until vaccines against infectious coryza and Chronic Respiratory Diseases became available. Given the same time frame and resources, the free range and barn flocks could reach a much lower disease status.

Comparative Australian mortality data are difficult to find and the available overseas studies do not provide a consistent picture but demonstrate the need to recognise disease in broader terms rather than only infectious diseases.

Regardless, the RIS appears to give the unaware public a clear impression that conventional cages are the most biosecured housing system and this is incorrect and misleading as comparatively they are not more biosecured than barn or indeed furnished cages.

7. Conventional and furnished cages
The list of pros and cons of the different housing systems is presented under the headlines; cage, barn and free range. Implicit in this presentation is the erroneous assumption by the RIS that apart from some innate behaviour differences, there are

no further advantages or disadvantages that could be attributed to the furnished cages when compared to conventional cages. However, in Table 27 in the RIS it is estimated that under Option D that includes furnished cages the following disadvantages will be encountered - higher incidence of disease, cannibalism, predation risks, and feather pecking, less reliable provision of feed and water; less efficient management of adverse weather risk, temperature, ventilation and biosecurity for the prevention of disease introduction). Since Option D includes furnished cages it is inaccurate and misleading to present such a list in the context of Option D (and totally ignoring FC being part of option D).

- The NZ studies (2011) on furnished cages concluded that the birds do make use of the nesting, perching and foraging facilities in the FC. Other studies concluded that the mortality and aggression were lower in the FC (Nicol 2017) and immunity and significant production traits were either unchanged or superior.

- The Farm Welfare Animal Committee (UK) (2007) considered that all commercial systems of production for laying hens offer some compromise in terms of the hen's welfare. However, well managed enriched cage systems are able to offer the potential for an acceptable balance between the requirements for the hen's health and welfare, and public health, in combination with economic and environmental considerations."

- The Canadian Poultry (Layer) Code of Practice Scientific Committee (Widowski et al. 2013) concluded that, based on scientific evidence, "Cages furnished with nest areas, perches and scratch mats generally maintain health and hygiene benefits of conventional cages while supporting the expression of some of the hens' motivated behaviour patterns.

The acceptance of furnished cage eggs by supermarkets and consumers remains unclear and may influence producers' choice but as long as the furnished cage option is in the mix of options being offered, it is misleading to provide a long list of disadvantages for options that include furnished cages that provide welfare advantages and share or even surpass health aspects attributed to conventional cages (see Appendix 1).

The furnished cages are featured under option D and Option F but without a clear presentation of the impacts on mortality, production, egg mass, or welfare.

This compromises the ability of stakeholders and community members to reach an informed decision and should raise a few questions about the effectiveness of the consultation.

Hesitancy about FC adoption due to costs and acceptance by the community of eggs from this system could be behind the opposition to FC by industry but it is difficult to fault the relative welfare superiority of FC in comparison to CC and its favourable comparison on production disease and mortality data with CC.

AECL data provided to the RIS, attributes a 2% production advantage to CC over FC in Table A3.1 and progresses to estimate replacement pullet requirements on the basis of this data. This is inconsistent with published studies but even if the 2% figure is accepted as valid, the higher egg mass as a result of reported (Nicol et al 2017) lower mortality in FC was not considered and may negate the requirement for additional laying capacity. Studies (Tactacan et al 2009) reported that hen-day egg production, feed consumption, egg weight, and percentage of cumulative mortality of laying hens were not affected by the cage designs. Specific gravity and the percentage of cracked and soft-shelled eggs were also similar between the 2 housing systems. However, the incidence of dirty eggs was significantly higher in enriched cages than in conventional cages. This can easily be mitigated and does not justify the 2% production advantage attributed to CC in the RIS.

Hence the calculations of costings in the RIS that are based on the additional 2% hen replacement requirement for option F are not based on scientific evidence and are likely to be inaccurate.

A significant issue is the spatial allowance per hen or group size – a critical welfare aspects. It appears from the estimates of costings under Options F and D that no allowance for additional housing and replacement pullets as a result of increased spatial cage requirement was considered. Hence, it would appear that the RIS rather than proposing 750 cm^2 /hen similar to the EU, Canadian and NZ standards, is sticking with the existing spatial cage requirement of 550-600 cm^2 /hen (3 bird cage) in both Options (D and F). There is data indicating that hens in small size cages typical of many conventional cages, are effectively prevented from performing even simple locomotor and comfort movements. Nicol et al (2017) reported studies by Dawkins and Hardie with the following ranges of space; to turn around (540 to 1,006 cm2), stretch wings (653 to 1,118 cm2), wing flap (860 to 1,980 cm2), preen (814 to 1,270 cm2), and ground scratch (540 to 1,005 cm2). A video kinetic study (Mench and Blatchford 2014 cited in Nicol et al 2017) determined the space required by hens to stand (563 cm2), turn around (1,315 cm2), lie down (318 cm2), and wing flap (1,693 cm^2). Just adding furnishings to existing cages at the current cage stocking densities is a recipe for a poor welfare outcome.

From a welfare aspect, adhering to a 600 cm^2 per hen is questionable even for the conventional cages and undoubtedly casts doubts on the entire welfare advantages inherent in the FC concept unless the intention is to provide spatial allowance that is consistent with the recognised spatial allowances in other countries and in the scientific literature.

There should be little doubt that furnished cages (FC) at the appropriate spatial allowance provide all-round better outcome than conventional cages at a reasonable cost and with the benefit of experience it can be concluded that the introduction of FC in Europe did not devastate the industry.

Australia should be able to benefit from advances in FC design and improvements following lessons learned in other countries but it remains doubtful that just squeezing a nest, a perch and a scratch tray in existing CC is the optimal way to progress welfare.

8. Selected Options (D or F)
The choice is firstly between a voluntary, or a regulatory approach and secondly between the basic regulatory option (C) and regulatory options that include the basic requirements (C) and additionally include options (Options D and F) that enable a greater array of behavioural needs than the basic option, or measures that reduce/improve other welfare impacts (Options E, G) but still include the basic option (C).

All have a price tag as per table below. The accuracy of the estimates could nevertheless be questioned.

	Net costs	**Cost difference compared to Option C**
Option C (proposed national standards)	$709.72m	N/A
Option D (10) (10-year phase out of cages)	$1,531.89m	**+$822.17m**
Option D (20) (20-year phase out of cages)	$1,125.35m	**+$415.63m**
Option E (reduction in stocking densities)	$1,527.68m	**+$817.97m**
Option F (require the availability of nests, perches and litter)	$1,128.11m	**+$418.39m**
Option G (no routine hot blade and no routine second beak trim)	$836.44m	**+$126.72m**

Non-regulatory options are unlikely to be effective in an environment where the changes sought are not necessarily consistent with farm profitability. My experience in the industry is that some sections of the industry would follow a voluntary Code completely, or partially but others would continue to do what they see fit. Independent auditing is only effective if accompanied with punitive actions and therefore, sadly, the regulatory route must prevail. However, that said, it is difficult to follow why Option B that assumes that "*operators of poultry businesses would incur voluntary costs, depending on the degree of adherence to the voluntary guidelines",* incurs $0 cost in the RIS. Isn't a voluntary cost still a cost or is there a parallel universe where a voluntary $ is not a real $?

To paraphrase Franklin D. Roosevelt; the test of our progress is not whether we expand welfare to those who have much, it is whether we provide enough for those who have little (hens in cages). The lack of freedom to perform well recognised needs is a non-equivocal welfare risk affecting 10.7 million birds for a long duration. This welfare element has been recognised in the MCOP since 2002. It is recognised in the RIS and internationally. Furnished cages increase the available behavioural repertoire with no trade-offs.

The only options that enable redress are Options D and F. It should be emphasised that Option D and Option F are practically very similar including costings.

Although option F is being presented as an option that offers availability of nests, perches and litter for all chicken layers in cage and non-cage systems, nests are available in all non-cage hen housing and litter (scratching substrate) is available already in the majority of non-cage systems. Nests are required under SB1.9 in non-cage systems in option C and litter is required under GB1.4 for tiered barn systems. Perches are recommended under option C (GB1.14 – GB1.16) for laying hens on litter. Hence, practically, whether 'already practiced', 'mandated', or 'recommended', significant enrichment elements are already present and/or included in the S&G under C. The only hens missing out on any enrichments are those in conventional cages.

The inclusion of perches in furnished cages may be deemed to be of equivocal scientific justification but as a package the furnished cages are able to meet more behavioural needs than conventional cages with the same, or more advantages than the conventional system (appendix 1). They meet (completely or partially) the welfare principles identified by the Standard Drafting Group, including *"space to stand, lie and stretch their wings and limbs and perform* (some) *normal patterns of behaviour"* and the principles identified by OIE including the "*provision of a physical environment that should allow comfortable resting, safe and comfortable movement including normal postural changes, and the opportunity to perform (some) types of natural behaviour that animals are motivated to perform".*

The only system where 2 enrichment elements (nests, scratching substrate) available to most indoor layers are missing is the conventional cage system. Furnished cages can remedy this, it is not subject to the disadvantages of the outdoor environment and enables a better adherence to the welfare principles identified in the Standard Drafting Group (SDG) and OIE.

Either option D or F would practically address predominantly the welfare of hens in cages. Both allow a voluntary choice between FC, FR and Barn and both achieve the same welfare objective.

The estimation of the incremental cost of Option F is based on the stated RIS assumption that all conventional cages would have to convert to furnished cages (RIS page 152). Apparently, option D is calculated on the basis of a wider choice (FC, FR, Barn) but ultimately both options leave it to producers to decide whether they elect the FC, barn or FR. Both options present very similar net costs (D20 and F - a difference of 0.7%). Therefore, the claim in the RIS (Table 50) that option F is more costly, or that it provides greater welfare benefits than D is slightly disingenuous when practically, both options, considering current industry practices and the proposed Standards and Guidelines under option C, would address predominantly welfare needs in cages.

The cost difference between Option C and Option D20 or Option F (approximately $415 -$418 million) can be paid over 10 years by imposing a 10 cent extra charge on every dozen eggs sold in Australia for a period of 10 years

9. Other Options
Option G - vary the proposed standards (option C) to ban castration, pinioning and devoicing, hot blade beak trimming at hatcheries, and routine second beak trim – unless there are exceptional circumstances (hot blade permitted in this circumstance).

GA9.12 – GA9.15 and SA9.14/15 address the beak trimming component and SA9.8 – SA9.12 address the pinioning, dubbing, desnooding of poultry. All these are already included in Option C.

Option G provides more specific direction, implicitly bans hot blade trimming and routine second beak trimming.

There is evidence that routine second beak trimming after 10 days of age is associated with significant welfare consequences and since the second procedure is not likely to be necessary if initial beak trimming using infra-red was done properly, the need for a second beak trimming as a routine practice is questionable. There may be exceptional circumstances that would require dispensation but the banning of routine beak trimming is justified. Although on the basis of the relatively small number of birds expected to be exposed to a second procedure, the welfare risk should be viewed as a low/medium risk, nevertheless, a single infra-red procedure done prior to 10 days of age would last the distance if done properly. Furthermore, the availability of a range of mitigation strategies to a routine second beak trimming bring into question the need for a routine second beak trimming. Identifying the special circumstances, especially ahead of the beginning of an outbreak of severe pecking/cannibalism may be difficult and the logistics of the process of approving such exceptional circumstances must be carefully evaluated and preferably formalised.

10. General
Many aspects of the RIS can be questioned on various grounds. The opportunity to do so would have been more productive before the RIS was released for public consultation rather than exposing the public to incomplete and erroneous information. Some of these aspects have been covered in my submission. Others questionable aspects include claims of:

- more reliable provision of feed and water in cages;
- more efficient management of adverse weather risk, temperature and ventilation in cage housing.
- easiest system for inspecting individual hens (cages).
- efficiency of feed utilisation in caged housed birds
- higher cost of eradication of emergency disease in free range flocks.
- spread of diseases in different housing systems
- stressed cause by restricting access to the outdoor in inclement weather
- future supply of free-range eggs could be a problem because of planning restrictions and suitable land shortages;

I‘ll not address any of the above in detail as ultimately they have little consequence to the choice of options that include furnished cages.

11. As to the Standards and Guidelines (S&G)

- Inconsistency in the S&G approach to different housing systems is evident (e.g. SA5.4 for outdoors but no similar standard for indoor although wild birds have been reported in a recent national survey to be prevalent in the indoor environment - 56%(Scott et al 2016). SA5.3.A –should also be applicable to indoor environments such as multi-age sheds)
- Inconsistency in the handling/management requirements for different species is evident.
    - A person in charge of emus "must ensure that natural aggression is effectively managed" but the same does not apply to other species including chickens,
    - SB11.1 for pigeons "A person in charge must ensure every effort is made to avoid aggression from male birds towards both hen birds and immature but the same is not applied to other species (GA3.16) that only require monitoring,
    - Maximum stocking density is applied for outdoor guinea fowl but not for other species,
    - B6.1- A person in charge must ensure geese are not force fed for any reason including pate production but no similar standard for ducks.
    - It is unclear why requirements/guidelines applicable to FR chickens are not applicable to other free range poultry. The reference to a laying period and nest boxes may not be applicable but free range turkeys, ducks and geese should be guided by a minimal framework of access and exemptions as well as sufficient shelter.
    - Carriage and lifting of breeder hens should be also applicable to commercial egg layers.

- There needs to be a clearer distinction between acceptable procedures for commercial poultry and pet poultry and distinction between surgical procedures performed by veterinarians under anaesthesia and those done by lay persons/farm staff.
- There are a few guidelines re management of the outdoor area or hours/time that is required for birds to have access to the outdoors but very few relevant standards to enforce minimal requirements on the accessibility or management of the outdoor area.
- Although aggression is not exclusive to outdoor flocks, little is required from person in charge of indoor flocks in this respect (except breeder flocks and M/F ratio).
- GB1.24- "Birds should be observed to be using shade/shelter structures and action taken to modify facilities if use is deficient". Indeed, observation should be required and action taken also if birds are not using the outdoor area for other reasons that can be mitigated and remediated.
- "*The opening that provides access between indoor and outside areas (pop hole) should be at least 35 cm high and 40 cm wide with a combined total width of all openings being 2 metres for each 1,000 birds*". This is guiding the opening dimensions for free range hens. Appropriate size opening should be recommended for other species, for example free range turkeys.
- GB1.21 *Birds should at least have daily access to the outdoor area immediately after the egg-laying period. The exceptions to this are during*

unsuitable weather conditions, while training birds to use the nests, under direct veterinary advice, during treatment specified in the Veterinary Health Plan, or on the day of depopulation". This is inconsistent with the exemptions in the Egg Labelling Standard and is likely to create confusion.

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Appendix 1 – Furnished cage dot points extracted from various references

European food safety authority (EFSA) (2005)

- Although reported percentages of downgraded eggs and especially dirty, broken and cracked eggs, are often higher when laid in furnished cages and to a greater extent, in alternative systems, considerable improvements have been observed recently and further advances can be expected, especially in Furnished Cages.
- Some studies have found that plumage condition is better in FCs compared with CCs.
- The most developed (i.e. best-designed) FCs seems to result in lower mortality compared with CC and Non cage.
- Resting and perching are important aspects of birds' welfare. Roosting at night on an elevated perch is a behavioural priority.
- Perches are well used in FCs and NCs when they are well designed and positioned. High perches are preferred

Elson et al (2015)

Furnished cages which comply with the EU Directive (199/74/EC) can achieve the lowest death rates of commercial poultry housing systems for layer hens - 3% cumulative mean mortality.

FAWC (Farm Animal Welfare Committee UK) 2007

- Considers that all commercial systems of production for laying hens offer some compromise in terms of the hen's welfare. However, well managed enriched cage systems are able to offer the potential for an acceptable balance between the requirements for the hen's health and welfare, and public health, in combination with economic and environmental considerations."
- The main welfare concerns about enriched cages involve the view that such cages still do not satisfy the hens' needs in terms of continuous confinement, restrictions on movement and expression of some behaviours, and a lack of true or meaningful enrichment. Such cages may offer hens more usable space but this may be insufficient to allow expression of the full behavioural repertoire, including foraging, dustbathing and extensive locomotion. <u>These disadvantages may be related more to design, layout, internal features and colony size rather than an inherent or fundamental aspect of enriched cages</u>.

Gast et al (2004)

- In both trials combined, *S. enteritidis* was recovered from 3.97% of eggs from hens in conventional cages and from 3.58% of eggs laid by hens in enriched cages — a difference that was not statistically significant,

Lay et al 2011

- Occurrence of infectious diseases (Tauson & Holm, 2002; EFSA, 2005) appears to be similar in furnished and conventional cages, whereas non-infectious conditions such as fatty liver and kidney disease and osteoporosis are more prevalent in conventional cages than in systems providing greater freedom of movement.

LayWel (2006) –

- The present study confirms some of the general conclusions drawn on mortality figures in the EFSA report of 2005 as regards the effects of genotypes and beak trimming and their interaction with housing systems. However, globally and with quite a considerable trend over some partners the present data tells that FC(small cages) from a mortality point of view show the lowest average mortalities.

MAF NZ 2011 (Evaluation of Furnished Colony Cage Systems for the New Zealand Egg Market, 2007 – 2010)

- Bone ash results reflected the amount of activity carried out by the birds, being highest in free range flocks, next highest in birds in furnished cages and lowest in cage flocks.
- There were no statistically significant differences in total shell quality defects detected between flocks, or flock type; there was the expected statistically significant (p=0.0001) increase in total egg shell faults with age.
- Mean Haugh units - When treatment groups were considered, the CC birds' Haugh Unit scores were significantly lower than either of the FC groups.
- These results show that faecal corticosterone levels were marginally higher in conventional cages compared to furnished cages, which were in turn slightly higher than free range samples.
- Perch usage during the day was a constant 20-25% across all times and treatments; at night this can be expected to increase with almost all of the hens using the perches (informal observations & video footage).
- Overall, the behavioural observations show that the birds do make use of the nesting, perching and foraging facilities in the FC
- This research has shown that brown layer hens housed in furnished colony cages under New Zealand conditions are capable of producing eggs as efficiently as when comparable birds are housed in conventional cages, when cage design is the only variable.
- Their (FC) overall rate of mortality was lower than FR or CC systems, especially when they were beak trimmed using modern IRBT equipment. They retained their feather cover and appeared calmer according to comments of those working in the sheds. This was backed-up in lower levels of faecal corticosterone in FC birds than recorded in birds in CC.
- On the negative side, the research exposed the greater potential for coccidiosis to develop when birds are exposed to faeces on scratch mats,

and showed that birds in the system had a statistically significant increase in the chances of suffering breaks to the furculum than birds in conventional cages
- On economic assessments such as feed conversion the FC birds performed as well as or better than CC birds. There were no significant differences in egg shell or internal quality parameters between the two systems.

Mature et al (2015)

- …..Therefore, we suggest that cage furnishing, which is recommended for improving the welfare of animals, is also beneficial for improving the immune response of hens under the stress condition.

Nicol et al (2017)

- The provision of perches within FCs reduces the number of birds that sleep in the nest and improves food conversion efficiency
- Compared with conventional cages, hens in furnished or colony cages show lower levels of aggression (Hetland et al., 2003; Shimmura et al., 2006), and more comfort behaviour (Shimmura et al., 2006; Shimmura et al., 2007a; Pohle and Cheng, 2009a).
- They are also more able to dissipate heat during hot weather by adopting appropriate postures (Guo et al., 2012), an effect that halved mortality in one study.
- If aggression does occur in small groups it can also be reduced by providing elevated structures such as perches that enable subordinate birds to move away from dominant birds (Cordiner et al., 2001), and aggression (as indicated by comb wounds) is reported to be lower in FCs than CCs (Hetland et al., 2003), likely for this reason.
- Although there is evidence that laying hens are frustrated if they are unable to access perches that they have previously used at night, evidence that hens “miss” perches if they have never been experienced is equivocal
- Daytime perching is thought to enhance hens’ sense of security, with reduced vigilance and fearfulness observed at a flock level in flocks with perches compared to flocks without
- LH4.2a - If perches are provided they are highly utilised at night for roosting (Olsson and Keeling, 2000). Brendler et al. (2014) found virtually 100% utilisation at perch heights of 90 cm or above in small experimental studies. On farm studies also demonstrate high night-time perch use in commercial flocks
- LH4.2 - It seems that hens are highly motivated to seek elevated areas at night for roosting, but further research is needed to establish whether birds need to grasp a rounded pole with their feet, or whether roosting motivation is satisfied by elevated platforms or grids that may pose less of a risk of bone damage.
- LH3.10 - The importance of exercise as a protective factor against harmful fat deposition patterns is shown by studies that report lower triglyceride levels in

free-range hens than in caged hens (Yang et al., 2014), lower abdominal fat deposits in caged hens provided with perches

- LH3.8 - Conventionally caged hens are more susceptible to elongated and damaged claws than hens in FCs
- LH3.4 - Although the rearing system has some effect on adult bone strength, with early access to perches improving the bone mineral content of tibia, sternum and humerus bones (Enneking et al., 2012), the opportunity to move and exercise in adult life has perhaps the major effect on adult bone quality (Regmi et al., 2016b).
- LH3.4 Compared with conventional cages, the strength of tibia (leg) and humerus (wing) bones (in particular) is improved in furnished or colony cages where birds exercise by moving on and off perches
- LH3.13 Specific studies have reported that hens in conventional cages (with generally high stress responses) are less resistant to experimental infection with Salmonella than hens from colony cages (de Vylder et al., 2009; Gast et al., 2013). A recent study also found many other measures of immune function (heterophil function, CD4+ and CD8+ T cell proportions and antibody production) were all improved in hens from furnished cages compared with hens from conventional cages (Matur et al., 2015).
- In furnished cages, the occurrence of infectious diseases has been shown to be similar to that in conventional cage systems (Tauson and Holm 2002 and 2003; Van Emous et al., 2003 as cited in EFSA, 2005), and in their review, Rodenburg et al. (2005) concluded that there was no significant difference in the level of bacterial contamination in the environment of conventional and furnished cages
- There appear to be few differences in risk of infectious disease or eggshell contamination between conventional and furnished cages.

Sherwin (2010) - The welfare of hens in 26 flocks (6 conventional cage, 6 furnished cage, 7 barn, 7 free-range) was assessed throughout the laying period .

- Vent pecking was most prevalent in free-range flocks. The lowest prevalence of problems occurred in hens in furnished cages
- Hens in conventional cages sustained more fractures at depopulation than birds in other systems. The lowest prevalence of problems occurred in hens in furnished cages.

Tactacan et al (2009)

- Cage type (FC/CC) did not affect the overall percentage of cracked eggs part from a higher percentage of cracked eggs of birds in conventional cages in period 7 and 8,
- The percentage of soft-shelled eggs was not affected by cage type.
- The percentage of dirty eggs in the conventional cages was consistently lower throughout the laying cycle.

- Bone mineral density of tibia and humerus of birds housed in enriched cages was significantly higher ($P < 0.05$) than birds in conventional cages
- Mean values of plasma corticosterone and antibody production (log_2 antibody titer against NDV vaccine) before and after vaccination for NDV (Table 5) and H/L ratio for laying hens housed in conventional and enriched cages were not affected by cage design

Valkonen (2009)

- Based on the results of this studies FC may have advantage as far as feed conversion.

Valkonen 2009 (E-mail)

- Based on the results of this study, perches reduce bird activity in FC, and help to reduce the number of hens spending their night in nests.
- In a study of Wall et al. (2008), the proportions of dirty eggs were 4.2 and 5.4% in furnished and conventional cages, respectively.
- Their results and other recently published studies show that with well-designed furnished cages it is possible to achieve similar results regarding proportions of dirty eggs as in conventional cages
- Tauson (2007). DeReu et al. (2005) compared the bacterial eggshell contamination of eggs laid in conventional cages with eggs laid in the nest boxes of furnished cages. No systematic difference in shell contamination with total counts of aerobic bacteria was found between these systems.

Valkonen 2010

- No change in the nutrient requirements between FC and CC

Widowski et al 2013

- Hens are motivated to perform nesting, foraging, perching, dust bathing, locomotion, and comfort behaviours (stretching limbs and wings). These behaviour patterns are significantly constrained in conventional cages due to lack of space and amenities. In furnished cages, nesting, perching and comfort behaviour appear to be well supported. However, foraging and dust bathing do not appear to be fully supported by scratch mats and this depends on the size and provision of sufficient litter or feed on the mat.
- Cages furnished with nest areas, perches and scratch mats generally maintain health and hygiene benefits of conventional cages while supporting the expression of some of the hens' motivated behaviour patterns.

Appendix 2 – Flock size costings and poultry welfare

The following aspects infringe on poultry welfare directly or indirectly, affect costings and are impacted by flock size:

- The ability to inspect individual animals
- Timely diagnosis of diseases
- Timely recognition of aggressive pecking and cannibalism
- The attention to individual birds and ability to provide timely treatment
- The usage of the range
- Social interactions of birds
- Salmonella prevalence and food safety
- Economic returns and niche market supply
- Level of interactions between buyers and the producer
- Local knowledge of the farm and its reputation
- Ability to obtain DA approval to build a farm in an area
- Environmental impacts lower from small farms
- Cost of labour
- Cost of housing and equipment
- Biosecurity
- Air quality
- Susceptibility to airborne diseases
- Susceptibility of spread of diseases through movements of personnel and vehicles
- Cost of controlling emergency diseases