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## Using Failure Mode and Effect Analysis (FMEA) in the Risk Analysis of Industrial Poultry Production for Decreasing Threats of Poultry by Analyzing Points of Failure

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**Abstract:** Regarding existence of different diseases such as gastrointestinal diseases, applying an appropriate diet is important. Poultry industry plays a significant role in this field. Therefore, sustainable and safe production in this industry is a necessity and this fact will not be possible; unless we minimize environmental pollution; improve quality and safety of poultry products; use optimally green and environmentally friendly resources; decrease use of nonrenewable resources, manage superfluous resources. All these facts; employing expert personnel, can help us achieve a healthy system in food and production. Today, poultry industry aims to process chicken without using antibiotics and chemicals. In this study we tried to define point of failure, analyze the effect of implying appropriate corrective actions applying failure modes and the effects analysis method (FMEA). Also, applying FMEA, we considered different aspects of risks and analyses. In order to decrease and test the risks and decrease deplorable threats, sustainable production has been analyzed in a defined period.

**Key words:** Industrial poultry, failure mode and effect analysis, sustainable manufacturing, bronchitis

### INTRODUCTION

In this study; first, we mention the main issues in poultry industry, then continue through organizing and planning them applying FMEA method and eliminate those issues: 1. Heavy Casualties During Rearing: The rate of ordinary casualties in halls of broiler chicken rearing; in case of lack of common diseases, is usually 10 percent; most part of which occurs on the first ten days of rearing. During outbreak of hazardous diseases (Influenza, Newcastle, Gamete euro, bronchitis, C.RD) the rate of casualties has been sometimes 30-40 percent which caused sometimes obliteration of flock. 2. Higher Slaughter Age: The age of maintenance shall be between 26 and 40th day. Exceeding this age may cause many problems for the flock. 3. Inappropriate conditions of maintenance and production: inadequate ventilation, nonuse of drugs, vaccine, etc. may cause significant increase in obliteration of chickens in middle-scale units, which possess the most portion of processing and consumption of green chicken. 4. Lack of Integrated Systems in Production Chain: This problem cause any system transfer its problems to previous and next sections, while different circles in poultry industry rear and produce without being informed of other circles. 4. Weak support from relevant organizations: Lack of support from relevant organizations such as standard organizations and international organizations in poultry industry for chicken farms cause an unsuitable situation in rearing and processing. 6. Weak Supervision on

Production Chain: Supervision on main circles in poultry industry; especially in sections of incubation and slaughtering, is very weak and this cause obliteration in poultry. 7. Dependence in production of chicken, phylum and green chicken: There are many complete chain of chicken production from line chicken to green chicken, but the increasing need for more production and the effect of fluctuation on green chicken production (as the last circle of production) and sometimes existence of diseases, etc. requires importing eggs and green chicken in higher stages of chain which is considered as one of the problems in this industry (David *et al.*, 2013; Joel Salatin, 1996; Jennifer Megyesi and Geoff Hansen, 2009).

**Industrial poultry:** Traditionally, every bird; regarding his style and individual initiative, through a simple building and construction and some workers, began to install poultry. Today, the very rapid progress in poultry nest building practices has become common. Buildings farms requires five basic factors including the following: 1-using nest 2-nest size 3-Classification of breeding poultry buildings 4-Lightweight Building 5-Building materials.

For the nest, poultry buildings should not be considered to be used for a long time. Poultry buildings should be constructed each 10-15 years. In some areas it is preferred to build the nest for 10 years. So, after this period without much damage to the birder, it would be

destroyed and a new nest will be constructed with the remaining material in accordance with the principles and rules of the day. The nests are divided into two categories; i.e., temporary and permanent. Temporary nest are usually small and more common in rural areas. This type of nests can be found using the security system and dramatically improving transport. For example, in some farms under the wheels of steel or wood, there are nests and the tractor is easily from one point to another. This type of seasonal nests are also used. In permanent nest most of the building material is formed, so it is non-transferable. These buildings are of brick and cement and concrete beam and can be built into niches. They are relevantly economic and safe and health is almost perfect.

**Size of the nest:** Size of nest and security depends on the conditions and extent of poultry and organizations. In general, there must be enough space for all hens and chickens. Large nests of buildings in hot climates are not recommended because their cooling and ventilation in summer is difficult. In general, poultry buildings are classified in one of the following three categories: Small nests and individual; such buildings are usually in small poultry farms and villages. Row nests; these buildings are in commercial and industrial firms and are used in poultry farms. Most large buildings are long and usually divided into several coops. There are different types of buildings and in some it may only be coops to be located in a row and some are in several rows. These nests are used usually in poultry business and large enterprises, especially in cities around in which there exists the problem of preparing the land and its expensiveness. Some defects will be noted such as expense, problems of safety and control, difficulty with monitoring and carrying nutrients to the upper floors and the elevators are needed to collect eggs.

The nests for poultry may be constructed as follows; Simple structure is very simple and inexpensive. Two roof structures; multi-tier and multi-floor nest often have such ceilings. These types of buildings often have two ceiling. This is vital in terms of air and the space of the former is better.

**Building materials:** The nests are often semi-permanent. After average 10-15 years, the nests must be built according to new safety systems. Hence, building materials must be selected; so that after this period, they can be realized without great loss and it makes the inhabitants of its materials to build new nests. The poultry nest materials may be used differently depending on the location and situation. For better safety in the poultry industry, devices such as wood, building stone, brick for a long time nests, metal and cement blocks are used. In addition to the fire and insect resistant, it must have a favorable safety and a well-established maintenance system (DiVenti, 2002; Xu *et al.*, 2007; Zhang, 2009).

## LITERATURE REVIEW

Failure mode and effects analysis (FMEA) was first proposed by NASA in 1963 for their reliability process. It is a powerful technique for system safety and reliability analysis of products in a wide range of industries (Lehotay *et al.*, 2001). FMEA was used in nuclear establishments and automotive industry in 1970 and 1973. Citroen and Peugeot Company for the first time, used this technique in their process of production. Now, FMEA is useful for all companies.

Ebeling (2001) great errors of companies can be reduced by use of FMEA method and cause severe unrevealed damage to the organizations. FMEA is examined in order to identify possible failures and they are considered to have got three measures (Plaza *et al.*, 2003; Valencia, 2003) the probability of failure occurrence (O), the impact or severity of the failure (S) and the capacity to detect failure before it occurs (D). Cost of heavy casualties and destruction of poultry equipments and devices, has led the Managers and experts in the poultry to implement systematic processes in order to eliminated or reduced the excess cost of poultry production. Failure modes and effects analysis technique seek to prevent loss of life in the herd and control of equipment failures in order to sustainably produce safe and highly-qualified products. Throughout FMEA technique you can take advantage of any failure of states in order to individually review and to prevent it as well as to carry out preventive measures. Therefore, it is required to have systematic preventive measures and failure analysis to prevent damage and casualties (DiVenti, 2002). In this poultry industry, FMEA approach is used to analyze and in this section manipulated functions and mechanisms of FMEA.

### When to Use FMEA:

- 1: When a process, product or service is being designed or redesigned, after quality function deployment
- 2: When an existing process, product or service is being applied in a new way
- 3: Before developing control plans for a new or modified process
- 4: When improvement goals are planned for an existing process, product or service
- 5: When analyzing failures of an existing process, product or service
- 6: Periodically throughout the process, product or service

**One of the best features of FMEA is its functions and (missing text)**

**Objectives of FMEA:** That this action method is rather than reaction in dealing with failure. A lot of money will be spent to resolve problems and damage caused by this action before failure rather than after it so, the FMEA

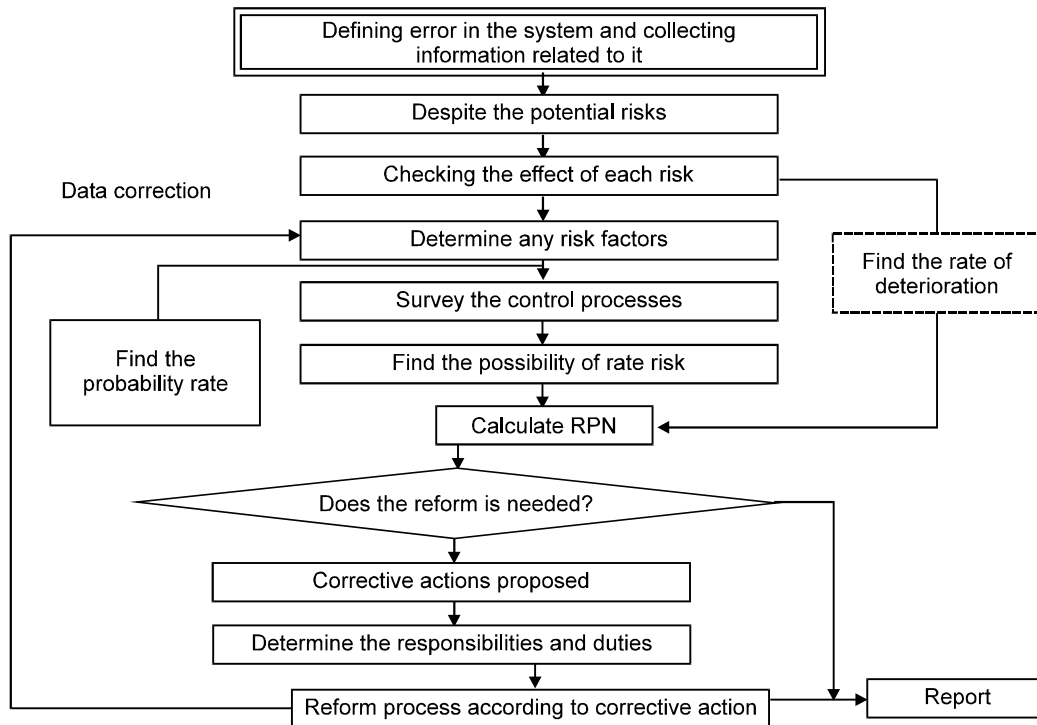


Fig. 1: The steps of FMEA process

Table 1: Severity rating scale of PI FMEA

Description	Rank of severity
Failure is of such minor nature that (internal or external) will probably not detect the failure.	1-2
Failure will result in slight customer annoyance and/or slight deterioration of part or system performance.	3-5
Failure will result in customer dissatisfaction and annoyance and/or deterioration of part or system performance.	6-7
Failure will result in high degree of customer dissatisfaction and cause non-functionality of system.	8-9
Failure will result in major customer dissatisfaction and cause non-system operation or non-compliance with government regulations.	10

Table 2: Occurrence rating scale for PI FMEA

Description	Rank of occurrence
An unlikely probability of occurrence: Probability of Occurrence <0.001	1
A remote probability of occurrence: 0.001 <Probability of Occurrence <0.01	2-3
An occasional probability of occurrence: 0.01 <Probability of Occurrence <0.10	4-6
An occasional probability of occurrence: 0.10 <Probability of Occurrence <0.20	7-9
A high probability of occurrence: 0.20 <Probability of Occurrence	10

Table 3: Detection rating scale for PI FMEA

Rank of detection	Description
1-2	Very high probability
3-4	High probability
5-7	Moderate probability
8-9	Low probability
10	Very low (or zero) probability

will be performed before the main factor of design and processing errors and FMEA can be described as a set of organized activities which are used for the following purposes:

- 1: Identification and estimation of potential errors in a product or process and results of these errors
- 2: Determination of activities which may reduce or eliminate probability of occurrence of potential errors

**Mechanisms of FMEA:** Failures are prioritized according to level of seriousness of their consequences, frequency of their occurrence and how easily they can be detected and we need to know that what would cycle activities or process of procedure in this method to be done during stages of FMEA completely engineering and precise with keep pace with this cycle (Carl S Carlson, 2012). Therefore, this process is represented with priority and regency of processes in Fig. 1.

**FAILURE MODE AND EFFECTS ANALYSIS (FMEA) METHOD**

The FMEA is a powerful design tool that provides; from a risk point of view, a means of comparing alternative poultry. The FMEA is also useful for considering designs improvements for a technology which is changing or

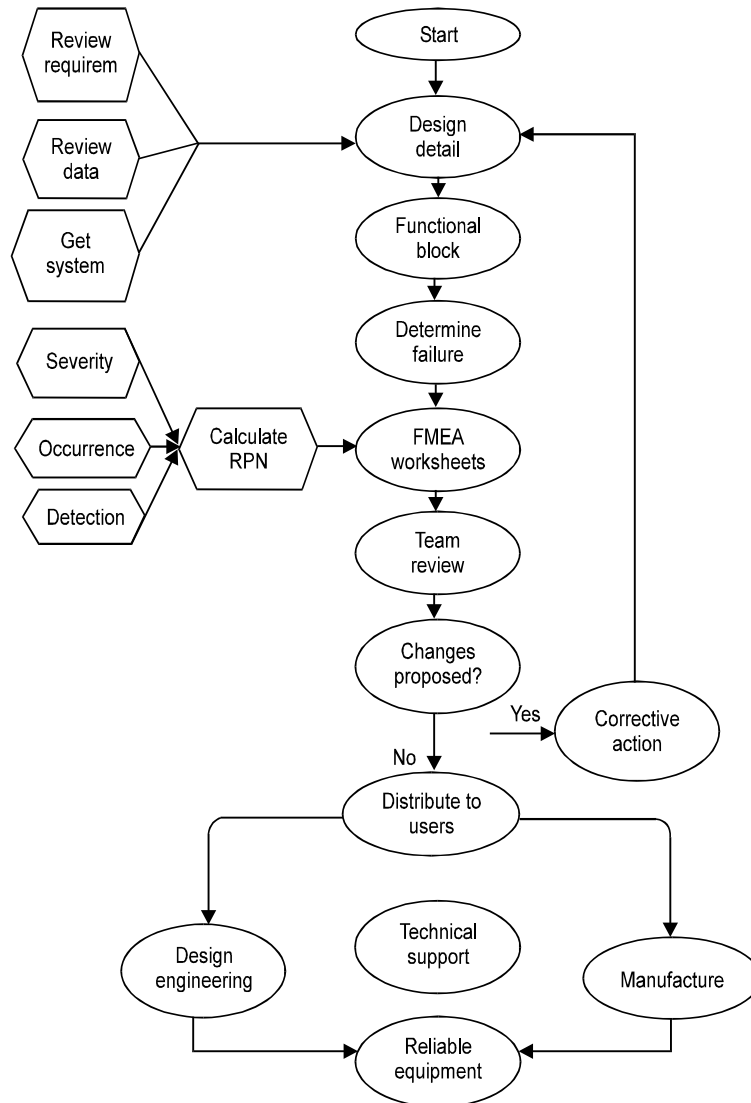


Fig. 2: FMEA process (Process Failure Mode Effect Analysis)

increasing in rate, as poultry project configurations are. The FMEA is a formalized but subjective analysis for the systematic identification of possible rooted causes and failure modes and estimation of their relative risks. The main goal is to identify and then limit or avoid risk within a design and ultimately produce better. Hence the FMEA drives towards higher reliability, higher quality and enhanced safety. It can also be used to assess and optimize maintenance plans. An FMEA is usually carried out by a team consisting design and maintenance personnel whose experience includes all the factors to be considered in the analysis. The causes of failure are said to be rooted causes and may be defined as mechanisms that lead to the occurrence of a failure. While the term failure has been defined, it does not describe the mechanism by which the component has

failed. The purpose of performing an FMEA is to analyze the product's design characteristics relative to the planned manufacturing process and experiment design in order to ensure that the resultant product meets customer needs and expectations. When potential failure modes are identified, corrective action can be taken to eliminate them or to continually reduce a potential occurrence. The technique uses occurrence and detection probabilities in conjunction with a severity criterion to develop a risk priority number (RPN) for ranking corrective action considerations (Hatami Nasab *et al.*, 2007).

**Fmea process:** Since the FMEA concentrates on identifying possible failure modes and their effects on the equipment, design deficiencies are identifiable and

improvements are made. Identification of potential failure modes leads to a recommendation for an effective reliability program.

Priorities on the failure modes can be set according to the FMEA's risk priority number (RPN) system. As the equipment proceeds through the life cycle phases, the FMEA analysis becomes more detailed and should be continued. The FMEA process consists the following:

- 1: FMEA prerequisites
- 2: Functional block diagram
- 3: Failure mode analysis and preparation of work sheets
- 4: Team review
- 5: Corrective action (Kim and Seo, 2004)

**Fmea prerequisites:** Review specifications such as statement of work (SOW) and the system requirement document and collect all available information that describes the subassembly to be analyzed then compile information on earlier/similar designs from in house/customer users such as data flow diagrams and reliability performance data from the company's failure reporting, analysis and corrective action system (Villacourt and September, 1992).

**Functional block diagram:** A functional block diagram is used to show how the different parts of the system interact with one another in order to verify the critical path. A list of all functions of the equipment is prepared before examining the potential failure modes of each of those functions (Villacourt, 1992).

#### Failure mode analysis and preparation of worksheets:

- (a) Determine the potential failure modes including subassembly failure modes, determination failure modes, manufacturing/process failure modes and component failure modes
- (b) The potential effects for each failure mode need to be identified both locally (subassembly) and globally (system)
- © Determine the potential cause of the failure
- (d) Many organizations have a design criteria that help them prevent the causes of failure modes through their design guidelines. Checking drawings prior to release and prescribed design reviews are paramount to determining compliance with design guidelines
- (e) Determine the Risk Priority Number (RPN)

The RPN is the critical indicator for determining proper corrective action on the failure modes. The RPN is calculated by multiplying the severity (1-10), occurrence (1-10) and detection ranking (1-10) levels resulting in a scale ranging from 1 to 1000 (Cunningham and Cox, 1987):

$$RPN = \text{Severity} \times \text{Occurrence} \times \text{Detection}$$

By targeting high value RPNs the most risky elements of the design can be addressed. RPN is calculated by multiplying the Severity by the Occurrence and Detection of the risk. Severity refers to the magnitude of the End Effect of a system failure. Occurrence refers to the frequency of occurrence of a rooted cause, described in a qualitative way. Detection refers to the likelihood of detecting a Rooted Cause before a failure may occur.

**Preparation of FMEA worksheets:** The FMEA worksheet refer to the "Fault Code Number" for continuity and traceability. The data that is presented in the worksheets should coincide with the normal design development Process. Example of information on the worksheet should include: Function, Failure, Failure Effects, Severity and Occurrence, Detection and RPN (Cunningham and Cox, 1987).

**Team review:** The suggested engineering team provides comments and reviews the worksheets to consider the higher ranked different failure modes based on the RPNs. The team can then determine which potential improvements can be made by reviewing the worksheets.

**Determination of corrective action:** In this Step, Design engineering team uses the completed FMEA worksheets to identify and correct potential design related problems and from the FMEA worksheets, the engineering team can suggest a statistically based preventive maintenance schedule based on the frequency and type of failure. Then the team could suggest a process be changed to optimize installations, acceptance testing, etc. This is done because the sensitivities of the design are known and documented (Arabian Hoseynabadi *et al.*, 2009; Gilchrist, 1993).

#### Steps (FMEA) in the poultry industry: Health:

- 1: All equipment and accessories including the seeds, washing and disinfect drinkers, etc
- 2: Useful and walls of the hall and out the flames as high as 1/5 m
- 3: Food grains and poultry
- 4: Floor storage compartment
- 5: Pharmaceutical
- 6: Environmental considerations

#### Keeping chickens:

- 1: Disinfect all surfaces (floor-ceiling-walls-roof)
- 2: Cleaning and disinfection, ventilation and electrical systems
- 3: Washing and disinfecting poultry houses
- 4: All doors and windows and Air Hall facility to disinfect

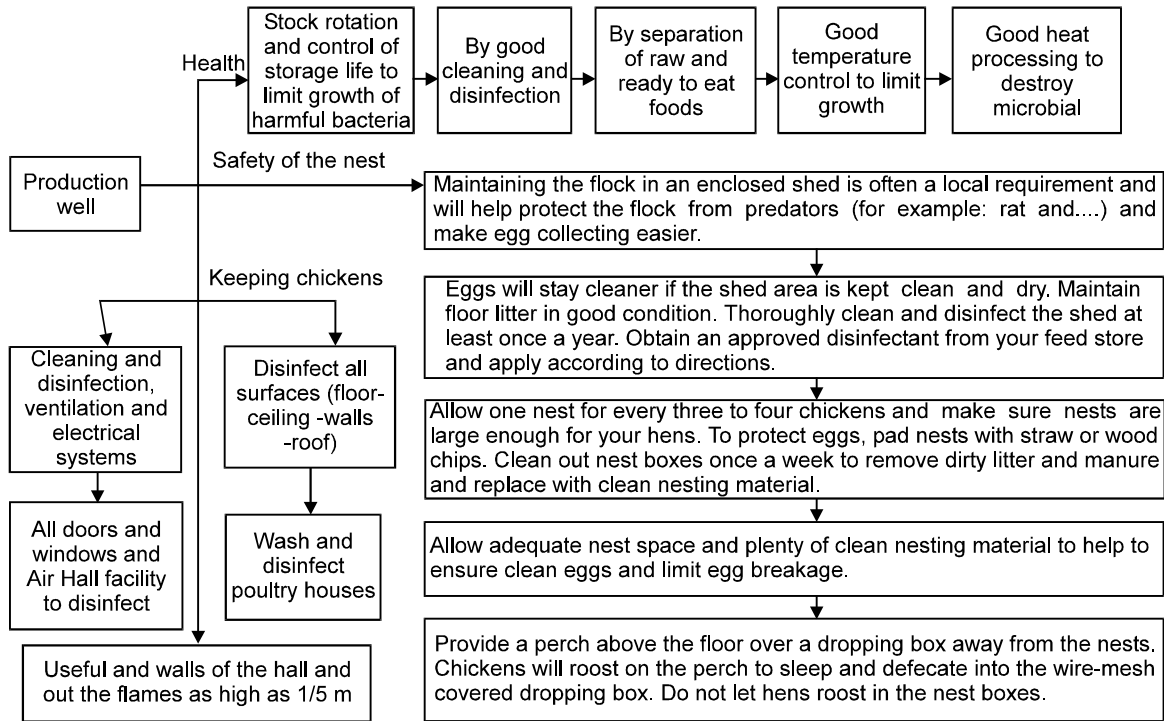


Fig. 3: A simplified process flow diagram for performing an impressive FMEA in poultry

**Safety of the nest:**

- 1: Repairing and restoration of all pores and eliminating downtime in the hall and other facilities
- 2: Electricity supply to the poultry
- 3: Repair and maintenance Farms (Bremner and Johnston, 1996)

**USING FMEA METHOD IN POULTRY INDUSTRY (CASE STUDY)**

In this Research, The maintenance methods of preventive maintenance, condition-based maintenance and corrective maintenance were analyzed. The maintenance needs of poultry industrial was determined using a failure mode, effect and criticality analysis (FMEA) process in order to understand the potential failures, their likely causes and the effects of such failures in poultry.

- 1: Construct a simplified process flow diagram for a poultry industrial
- 2: Create block diagram of the equipment in Level I, II and III
- 3: Calculate the RPN of each particular failure mode

Construction the FMEA Worksheet according to information gathered in the analysis and management, has clearly implemented the corrective action based on cost, time and resources. The FMEA studies software

tools, including FMEA Worksheet, considered in this paper are as XFMEA software (Kim and Seo, 2004; Bedford, 2000).

**According to Table 4:** To achieve improvements in industrial poultry preventive maintenance (P.M) teams shall be strong in order to improve the ventilation system and safe storage of poultry air must have no pollutants and ventilation in the summer and winter. Workers have also committed and poultry specialists can improve the growth of newborn chickens. Using Nutrition growth Services in poultry production and poultry industry can be improved. By work of the specialists, P.M teams and committed workers chicken, production can be improved.

By increased efficiency in the production, disease in the herd will be minimal. This will help us to produce green Chicken which is our main goal in production (Bremner and Johnston, 1996; Kim and Seo, 2004; Bedford, 2000; Rodricks *et al.*, 1987; Goettsch *et al.*, 2000).

**RESULT OF PERFORMANCE FMEA IN THE POULTRY**

Infectious Bronchitis (IB) disease is an acute, highly contagious and infectious disease of poultry in worldwide, possess a major threat to the poultry industry and was first reported in North Dakota, USA, as a novel respiratory disease by Schalk and Hawn (1931).

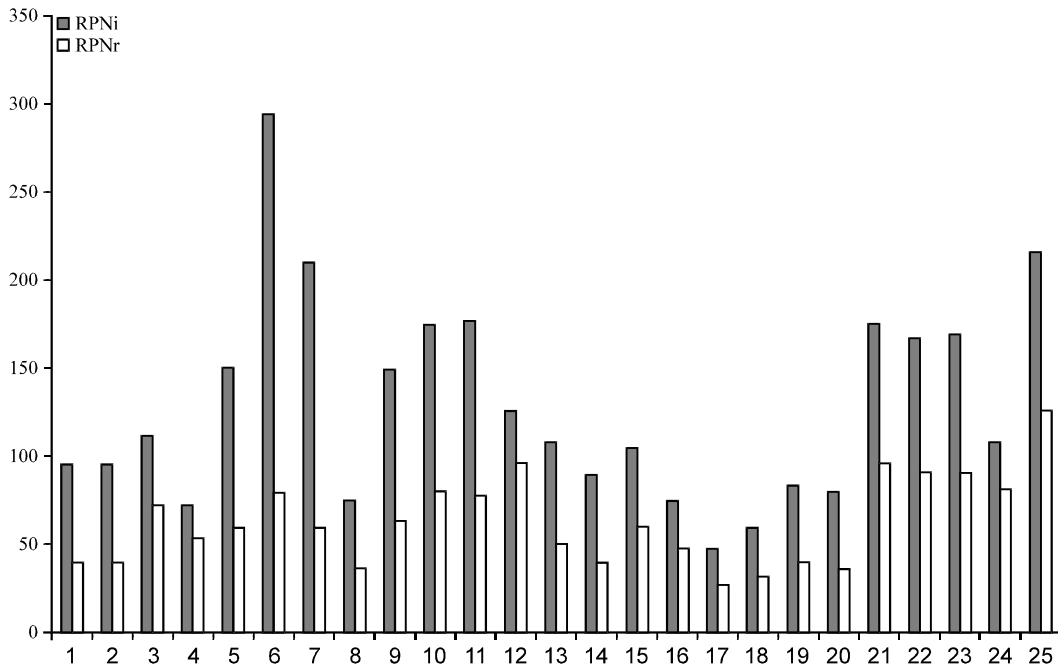


Fig. 4: RPNi comparison with RPNr

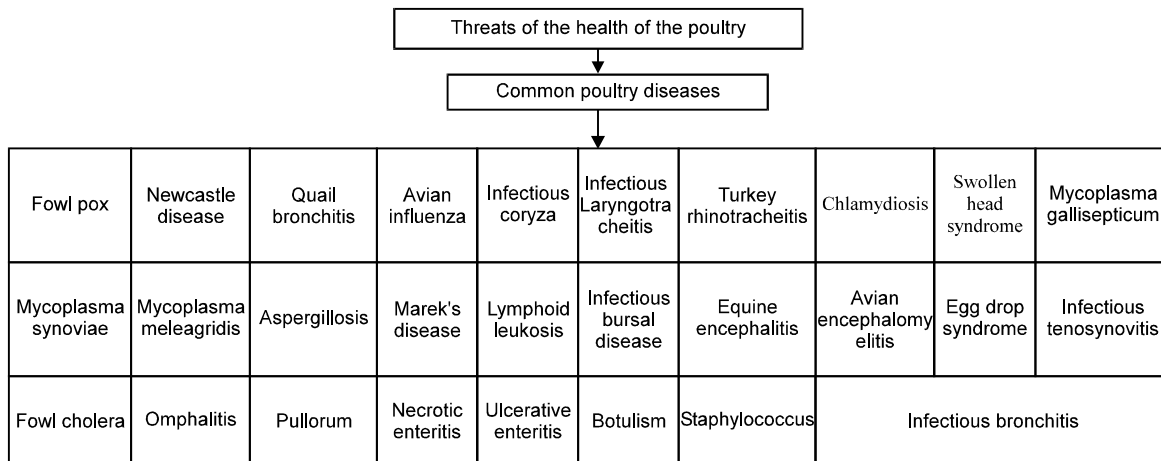


Fig. 5: Disease that threat the poultry

Its affects vary with: the virulence of the virus; the age of the bird; prior vaccination; maternal immunity (young birds) and complicating infections.

Morbidity may vary 50-100% and mortality 0-25%, depending on secondary infections. The cause is a corona virus that is antigenic ally highly variable; new sero-types continue to emerge. About eight sero-groups are recognized by sero-neutralization. Typing by haemagglutination-inhibition is also used. These differences are due to structural differences in the spike proteins (S1 fraction).

Infection is via the conjunctive or upper respiratory tract with an incubation period of 18-36 h. The infection is

highly contagious and spreads rapidly by contact, fomites or aerosol. Some birds/viral strains can be carriers to 1 year. The virus, which may survive 4 weeks in premises, is sensitive to solvents, heat (56°C for 15 min), alkalis, disinfectants (Formal 1% for 3 min). Poor ventilation and high density are predisposing factors. This disease has got harm to poultry that sample of this research exactly analyze Infectious bronchitis and is performed in this section that is clearly observed in Fig. 5.

**Reasons of the infectious bronchitis:** In this section, we focus on Infectious Bronchitis and what causes



Table 4: FMEA worksheet of industrial poultry

Citon	Failure	Effect	Si	Cause	Oi	Control	Di	RPNi	Recommended Action	Person Responsible	Sr	Or	Dr	RPNr
Production stage	1 Ventilation system	Poor Heating	6	Dead chickens	4	Successful inspection and appropriate engineering team to improve and upgrade	4	96	Controlled ventilation system at least twice a day	Repair and maintenance team	5	2	4	40
	2 Heating system	Excessive heating	7	Dead chickens	4		4	112	Controlled ventilation system at least twice a day	Repair and maintenance team	6	3	4	72
	3 Power system	Of electrical connection system	6	Poor lighting and poor heating and cooling of weak	5		5	150	Controlled ventilation system at least twice a day	Repair and maintenance team	5	4	3	60
	4 Eliminate pollution and cleaning	Disinfection of all compartments to keep chickens	7	Dirt and chick dead and the presence of harmful animals	7		6	294	Cleaning poultry completely	Industrial poultry service team	5	4	4	80
	5 Safety of Nest against predators (rats, etc.)	Safety and closure of small containers nest	7	Presence of harmful animals such as rats and disease outbreaks	6		5	210	Control different parts of poultry	Repair and maintenance team	5	4	3	60
	6 Poultry Nutrition	Indirect loss of food	5	Place was not suitable for eating poultry	5		5	75	Proper selection of poultry workers storekeeper	Part industrial poultry granary	4	3	3	36
Cost of poultry	7 Cost of spoiled food	Deterioration of food	5	Lack of workers	6		5	150	Strong engineering team to inspect food	Part industrial poultry granary	4	4	4	64
		Spilled food	7	Lack of labor and manpower	5		5	175			5	4	4	80
		Spilled food purchased	5	Lack of labor and manpower	5		5	175	Doctor to determine food ration for each group of herd	Poultry feed engineering team	5	4	4	80
	8 Per capita cost associated with chicken	Costs for raising chickens purchased from outside	6	Reduce costs in this area can cause dead hens	7	Inspection Team Nutrition and growth control hens	3	126	Doctor to determine food ration for each group of herd	Poultry feed engineering team	6	8	2	96
	9 Cost of labor	Cost of labor services	6	Inadequate maintenance of poultry increased labor costs	6	Control activities performed by workers to successive	3	108	Skilled workers employed	Poultry management	5	5	2	50
10 Fuel costs		Fuel Cost of for the production of artificial heat	6	Lack of proper maintenance systems increase fuel costs	5	Inspection of successive heating systems	3	90	Maintenance team to improve heating and reduce fuel consumption	Repair and maintenance team	5	4	2	40
		Fuel Cost of for total poultry	7	Lack of proper maintenance systems increase fuel costs	5		3	105			6	5	2	60
11 Vaccination and medication costs		Purchase Cost of vaccines and drugs	5	Not cost caused loss of chickens	5	Inspection of drugs and vaccines by a veterinary doctor, specialist	3	75	Hire a professional veterinary doctor	Veterinary doctor	4	4	3	48
		Cost of injection	4	Not cost caused loss of chickens	4		3	48			3	3	3	27

Table 4: Continued

Ction	Failure	Effect	Si	Cause	Oi	Control	Di	RPNi	Recommended Action	Person Responsible	Sr	Or	Dr	RPNr
Phase operation	12 Breaking eggs	Ambient heat	5	Heat loss of fresh eggs	4	successful control workers collect eggs	3	60	Workers committed to doing and patiently to be selected in this section	Poultry management	4	4	2	32
		During transport	7	Improper carry caused the loss of eggs	4	Cont. successive, transportation workers eggs	3	84	Use of appropriate transport		5	4	2	40
13	Feed efficiency in low heat	High temperature	5	Dead chickens	4	Successful inspection and appropriate engineering team to improve and upgrade	4	80	Controlled ventilation system at least twice a day	Repair and maintenance team	4	3	3	36
		Low temperature	5	Dead chickens	4	Appropriate engineering team to improve and upgrade	4	80			4	3	3	36
14	Reduced feed efficiency of inappropriate formulas	Inappropriate diet composition	7	Reduced growth of chicks	5	Inspection team nutrition and growth	5	175	Doctor to determine food ration for each group of herd	Poultry feed engineering team	5	4	4	80
		Inappropriate food ratios	6	Reduced growth of chicks	6	control hens	5	180			5	5	4	100
15	Humidity	Very dry environment	7	Disease outbreaks and respiratory disease	4	Place control hens daily	4	112	Control workers and successive inspection of the place held	Team provider of industrial poultry	5	3	3	45
		Too much humidity	8	Disease outbreaks and Koo Cassidy can continue their lives	4		3	96			7	4	3	72
16	Set the temperature of the hall	Repair and maintenance	7	Disease outbreaks and loss of chickens and side risks	5	Successful inspection and appropriate engineering team to improve and upgrade	5	175	Controlled ventilation system at least twice a day	Repair and maintenance team	6	4	4	96
		Thermoregulation	7	Chicks loss	6	team to improve and upgrade	4	168			6	5	3	90
17	Collect chickens	Chicken Little	7	Chicks loss	6	Control workers to collect the mature chickens raised	4	168	Workers inspect a week	Doctor specialist veterinarian	6	5	3	90
		Dead chickens	9	Disease outbreaks	3	Control service sector workers to collect dead chickens	4	108	Workers inspected daily		9	3	3	81
18	Drinkers and dining height adjustment	Appropriate adjustments	6	Poor productivity growth in chickens	6	Labor Inspection	6	216	Daily inspection of workers activities	Service workers	5	5	5	125

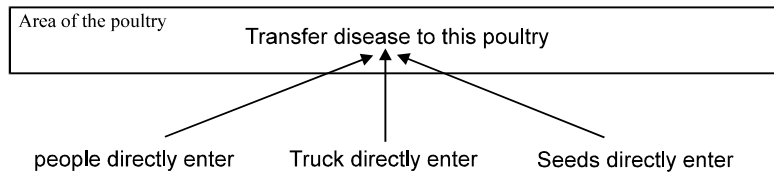


Fig. 6: Transferring disease to the poultry

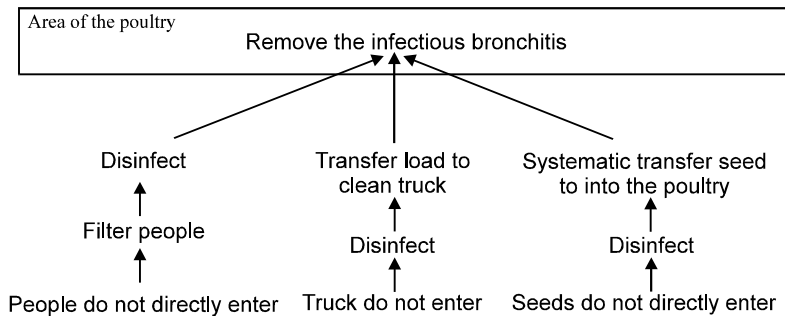


Fig. 7: Elimination of those disease from cycle of poultry

infectious bronchitis. The virus is highly variable and new stereotypes continue to appear. The virus dies quickly outside of the host but can spread through the air and can travel considerable distances during an active outbreak. It can also be spread by mechanical means such as on clothing, poultry crates and equipment. The disease is not egg-transmitted and the virus will survive for probably no more than one week in the house when poultry are not present. It is easily destroyed by heat and ordinary disinfectants. Classical Australian strains are nephrite pathogenic (cause kidney damage) and treatment using electrolytes may be beneficial in an outbreak. Insufficient work has been done on antigenic variants in Australia and we have a limited range of vaccines available (all local strains). This subjects is shown in Fig. 6 (Mazurina, 1984).

**Perform FMEA in the poultry:** It is constructed one location of safeguard out of the poultry that have no permission to enter into the poultry that this subject is shown in Fig. 7.

**Conclusions:** The failure modes included in the FMEA are the failures anticipated at the design stage. As such, they could be compared with failure reporting, analysis and corrective action system results, once actual failures are observed during test and production and operation. Regarding safety, the safety of poultry in three areas of health, safety and maintenance and safety of the nest, one can say that our cattle diseases by following these tips will be zero. It should underestimate endangering risks. By increasing safety in the poultry flock, mortality rate will be minimized. With reduced mortality and increased safety in all areas of poultry flocks, the

prevalence of chemical drug and antibiotic consumption could be minimized. As a result, according to a weekly or monthly basis for healthy poultry flocks, vaccination rate will reduce. Vaccine and frequent use of antibiotics can keep chickens healthy as artificial, but it certainly impacts on health of human who uses poultry meat. Thus benefiting from all points of FMEA leads potentially to declining use of vaccine, chemical drugs and antibiotics. The green chicken is compatible with the environment and human gastrointestinal tract. By the way, we will have a sustainable production and development in which important factors such as environmental pollution, optimized application of resources and lowered use of nonrenewable resources, waste management, considering benefits for the personnel, organization and finally the society have been considered.

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