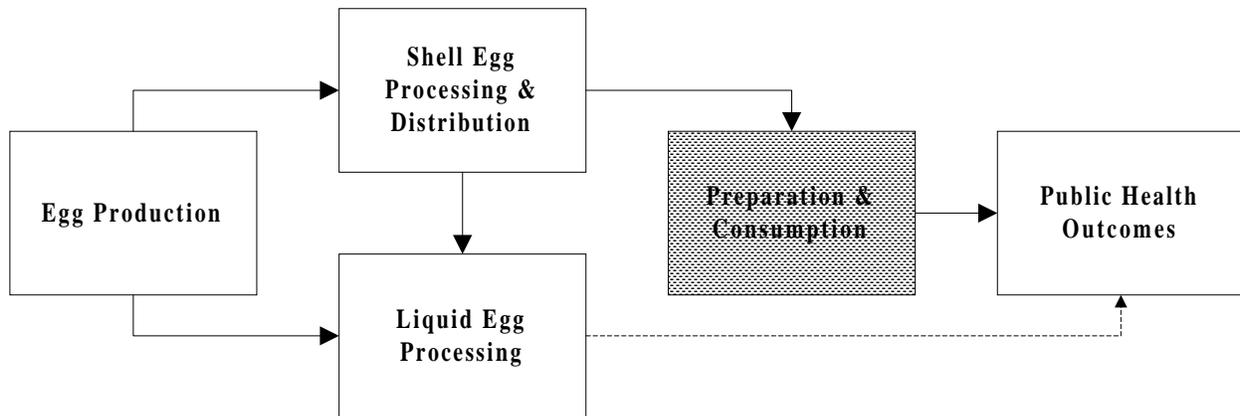


Preparation and Consumption Module



A. Summary of Preparation and Consumption Module

The objective of the Preparation and Consumption module is to determine the number of egg-containing servings contaminated with SE and the extent of the contamination in foods originating from SE contaminated eggs. These distributions are used by the Public Health Outcomes module.

This module describes exposure from the consumption of eggs and egg-containing foods that are contaminated with SE. Eggs for end-user consumption have an associated probability and level of contamination. We make assumptions about home and institutional use, pooling, types of use, and cooking practices and simulate eggs moving through different pathways. With the exception of eggs in pools, contamination of eggs after production is not modeled. Since the prevalence of contaminated eggs is very low, we model only contaminated eggs to avoid needless iterations involving hundreds of thousands of non-contaminated eggs. The final distributions represent sums of all the possible pathways through the model. The final distributions are used with the total number of eggs produced to determine the number of servings contaminated with SE.

The module models sixteen different pathways through preparation and consumption. The sixteen pathways represent all the possible combinations of whether an egg is for home or institutional use, whether the egg is pooled or not pooled, whether the egg is used as an egg or as an ingredient incorporated into another product. Figure D-1 (page 151) shows the processes through which an SE-positive egg passes in the Preparation and Consumption module.

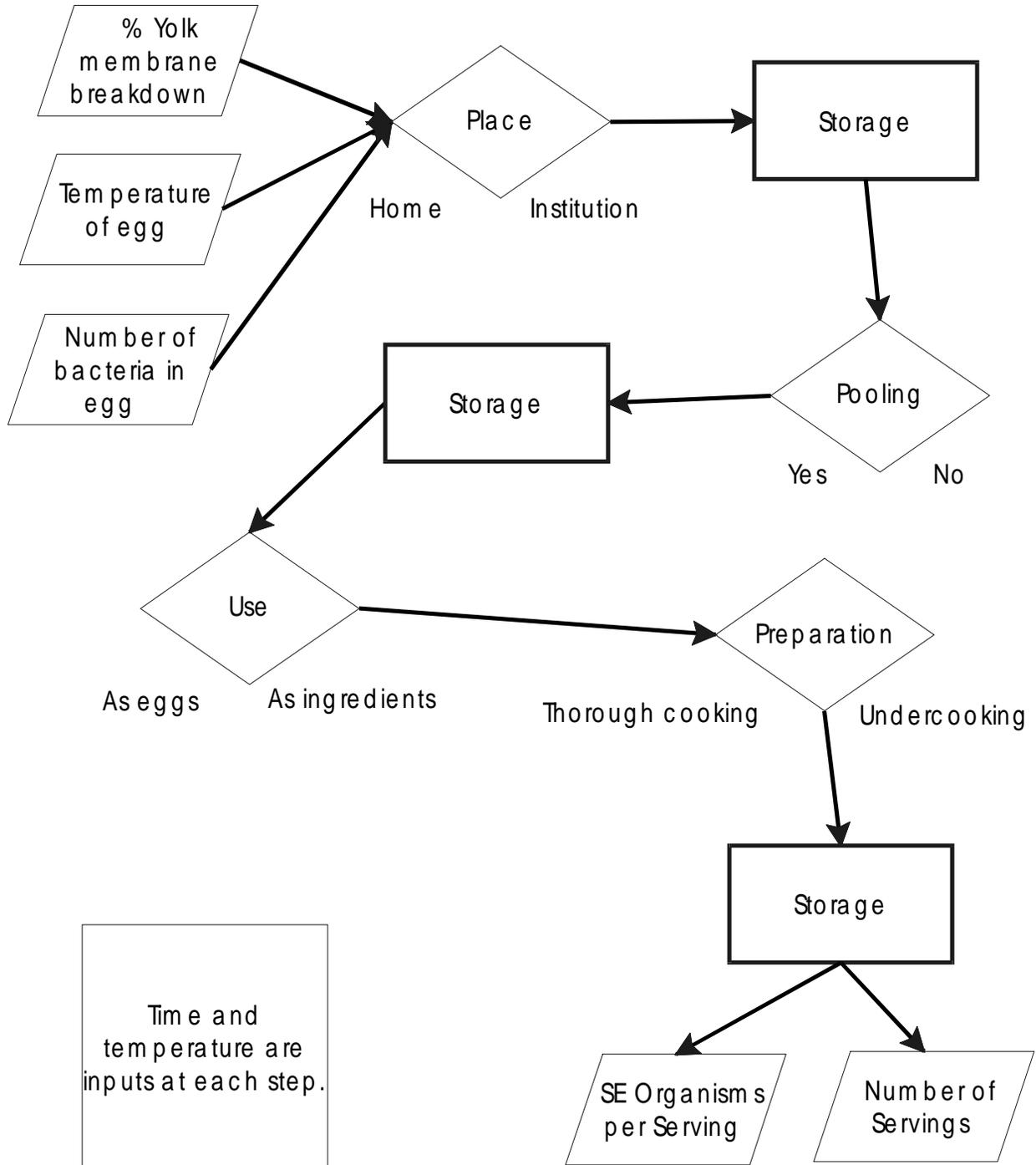
The inputs from the Shell Egg Processing and Distribution module are the percentage of yolk membrane breakdown that has occurred, the internal temperature of the egg, and the number of bacteria in the egg. The egg is either used in the home in which case it is subjected to storage at retail and in the home or it is used in an institutional setting where it is also subjected to storage.

Preparation and Consumption Module

The egg is then either pooled or not pooled before use. If it is pooled before use, it is again subjected to storage. The egg is then either used and eaten as an egg or it is used as an ingredient that is incorporated into a recipe. In either case, the product is then subjected to some type of heat treatment through cooking. After the product is prepared it is subjected to short term storage before consumption. The outputs to the public health module are the number of servings per original SE-positive egg and the number of SE bacteria in each of those servings. At each of these steps the influence of ambient temperature and storage time is included.

Figure D-1

Preparation and Consumption Process Diagram



Preparation and Consumption Module

B. Inputs to Preparation and Consumption Module

1. Number of SE bacteria in contaminated eggs
2. Percent yolk membrane breakdown

Preparation and Consumption Module

C. Preparation and Consumption Module Variables

1. Probability of an egg going to an institutional consumer

a. Evidence –

The United Egg Board estimated the following distribution of eggs into the marketplace in 1996

Market distribution	Million cases	Percent
Purchased at retail	94.1	53.0%
Further processing	49.5	27.9%
For food service use	30.9	17.4%
Exported	3.1	1.7%

b. Mean – 24.7%

30.9 million cases of eggs are used by institutional consumers (food service) and 125 (94.1 + 30.9) million cases of eggs are produced for the domestic table egg market. Eggs produced for food service are 24.7% (30.9/125) of table eggs produced.

c. Distribution – None

Preparation and Consumption Module

Precooking Storage Times and Temperatures

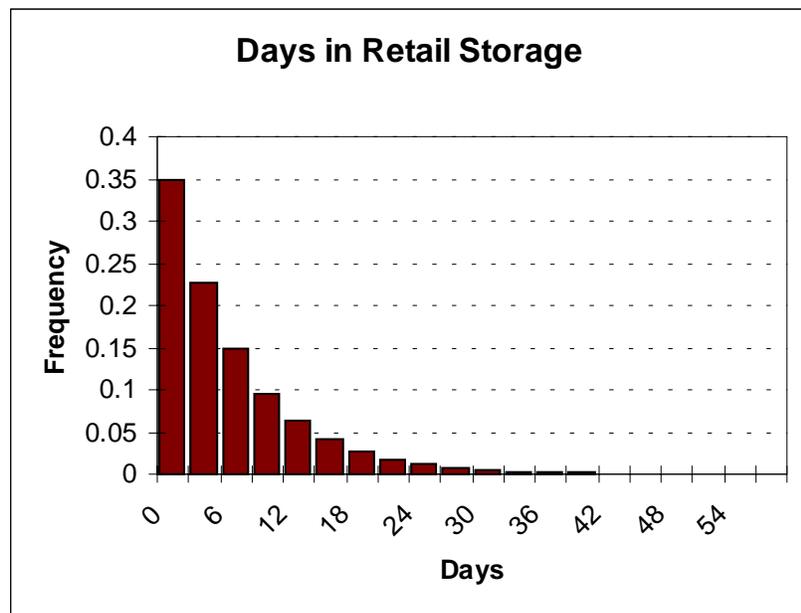
2. Retail storage time (days)
 - a. Evidence –
Personal experience
 - b. Mean value of distribution – 7 days

Many egg producers use pull dating on cartons. Pull dating (30 days) is required on cartons with the USDA shield (about 30% of eggs). We assume that half of the eggs will be through retail storage within 14 days.

- c. Distribution – Truncated Exponential(7,0,60)

This distribution assumes that half of all eggs leave retail storage within 5 days; the other half leave storage within 60 days.

Figure D-2



Preparation and Consumption Module

3. Retail storage temperature (F)

a. Evidence –

Personal experience

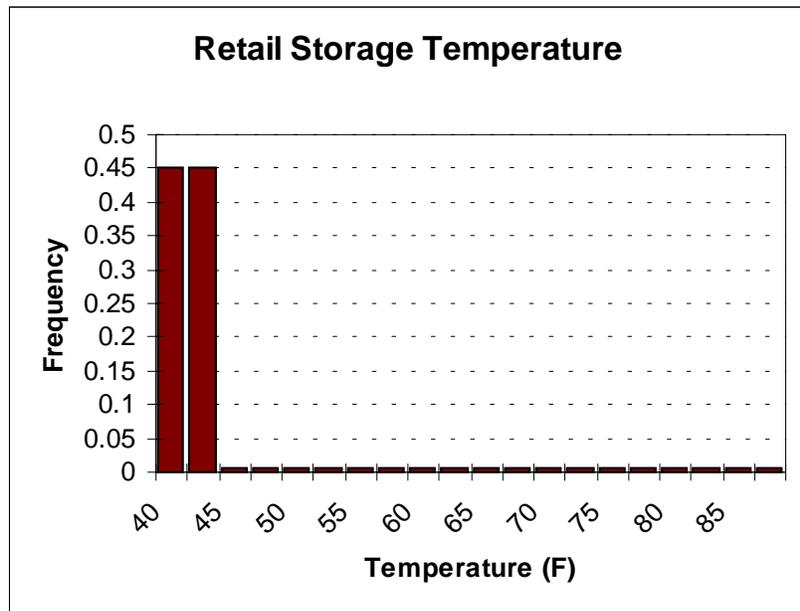
b. Mean value of distribution – 45° F.

FDA has defined eggs as “potentially hazardous” since August, 1990. It is reasonable to assume that most retail eggs are stored under refrigeration.

c. Distribution – Discrete({Uniform(40,45),Uniform(45,90)},{.9,.1})

This distribution assumes that 90% of eggs are stored under refrigeration at temperatures ranging uniformly from 40-45° F and that 10% of eggs are stored unrefrigerated or poorly refrigerated at temperatures ranging from 45-90° F.

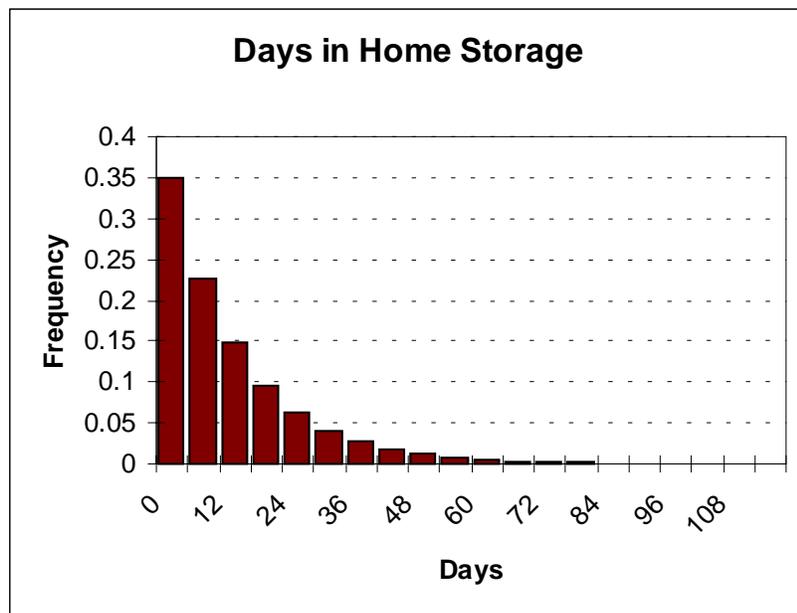
Figure D-3



Preparation and Consumption Module

4. Storage time in home setting (days)
 - a. Evidence –
Personal experience
 - b. Mean value of distribution – 14 days
It is assumed that half of all eggs are used within one month in the home.
 - c. Distribution – Truncated Exponential(14,0,120)
This distribution assumes that half of all eggs are used by the consumer within 10 days; the other half are used within 120 days.

Figure D-4



Preparation and Consumption Module

5. Storage temperature in home setting (F)

a. Evidence –

Personal experience

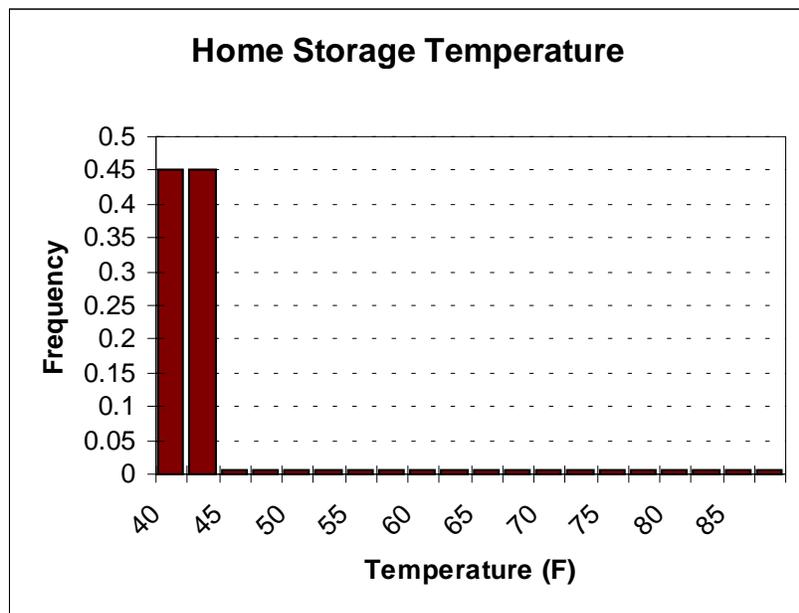
b. Mean value of distribution – 45° F.

It is reasonable to assume that most people store eggs under refrigeration at home based on personal experience.

c. Distribution – Discrete($\{\text{Uniform}(40,45), \text{Uniform}(45,90)\}$), $\{.9, .1\}$

This distribution assumes that 90% of eggs are stored under refrigeration at temperatures ranging uniformly from 40-45° F and that 10% of eggs are stored unrefrigerated or poorly refrigerated at temperatures ranging from 45-90° F.

Figure D-5



Preparation and Consumption Module

6. Storage time in institutional setting (days)

a. Evidence –

Personal experience

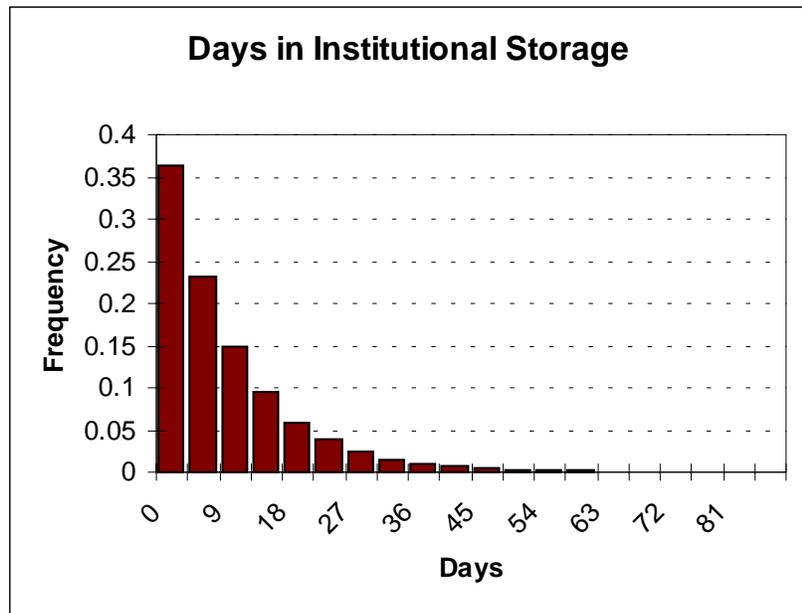
Mean value of distribution – 10 days

Storage of eggs in institutional settings is assumed to be longer than at retail but shorter than in home storage.

b. Distribution – Truncated Exponential (10,0,90)

This distribution assumes that half of all eggs leave storage in an institutional setting within 10 days; the other half leave storage within 90 days.

Figure D-6



Preparation and Consumption Module

7. Storage temperature in institutional setting (F)

a. Evidence –

Personal experience

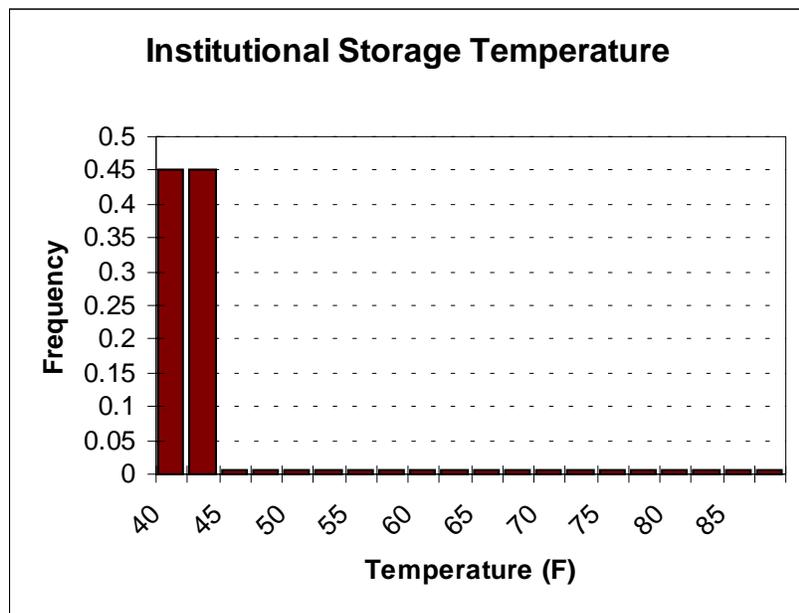
b. Mean value of distribution – 45° F.

FDA has defined eggs as potentially hazardous since August, 1990. Thus, it is assumed that most institutional eggs are stored under refrigeration.

c. Distribution – Discrete({Uniform(40,45),Uniform(45,90)},{.9,.1})

This distribution assumes that 90% of eggs are stored under refrigeration at temperatures ranging uniformly from 40-45° F and that 10% of eggs are stored unrefrigerated or poorly refrigerated at temperatures ranging from 45-90° F.

Figure D-7



Preparation and Consumption Module

Pooling Variables

8. Probability of pooling in home setting

a. Evidence –

Personal experience

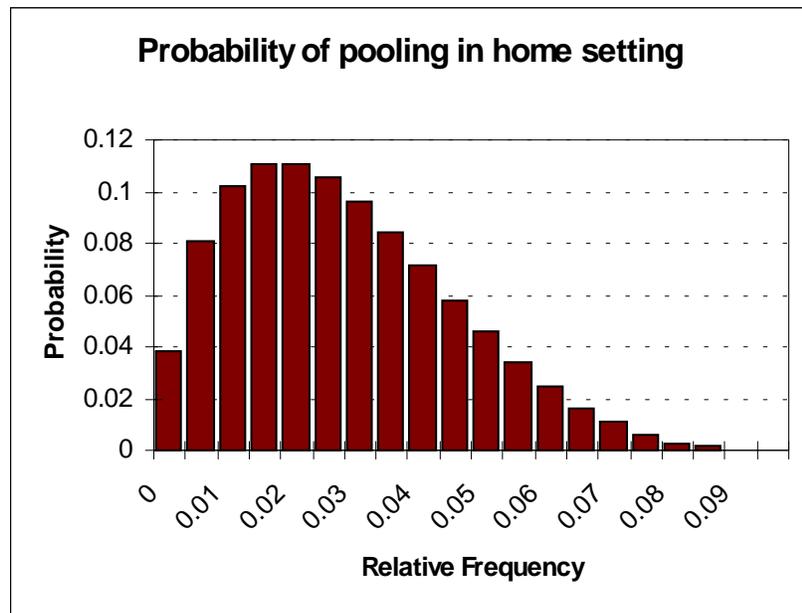
b. Mean value of distribution – 3%

It is assumed little pooling of eggs occurs in home settings. Nevertheless, there will be some occasions when eggs are pooled for recipes, later cooking, or separated and stored.

c. Distribution – Pert(0%,2%,10%)

The range of probabilities models the uncertainty about the true prevalence of pooling eggs in the home. The probability of pooling eggs at home ranges from 0-10% with half the values falling below 3%.

Figure D-8



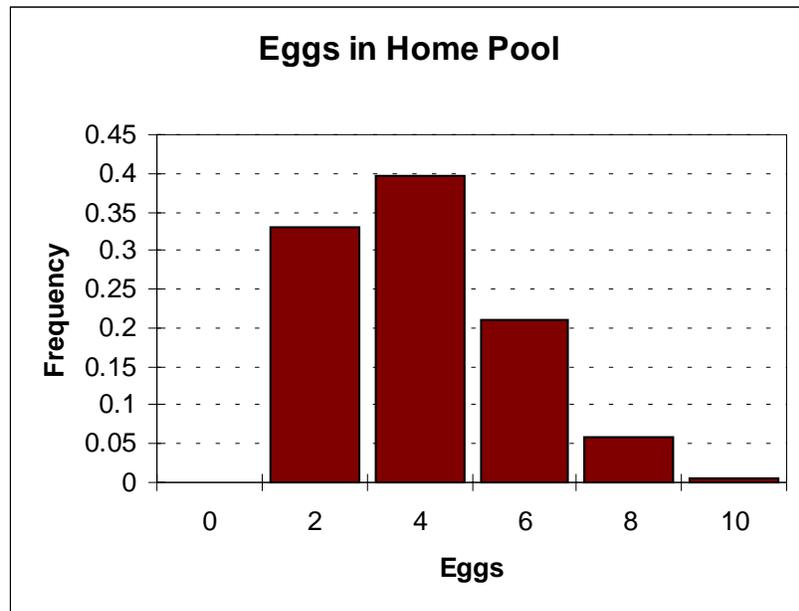
Preparation and Consumption Module

9. Number of eggs in pool in home setting

- a. Evidence –
Personal experience
- b. Mean value of distribution – 5 eggs
- c. Distribution – Round(Pert(2,4,12))

It is assumed that the number of eggs in a pool in the home varies from 2-12 with half the values at 5 eggs or less.

Figure D-9



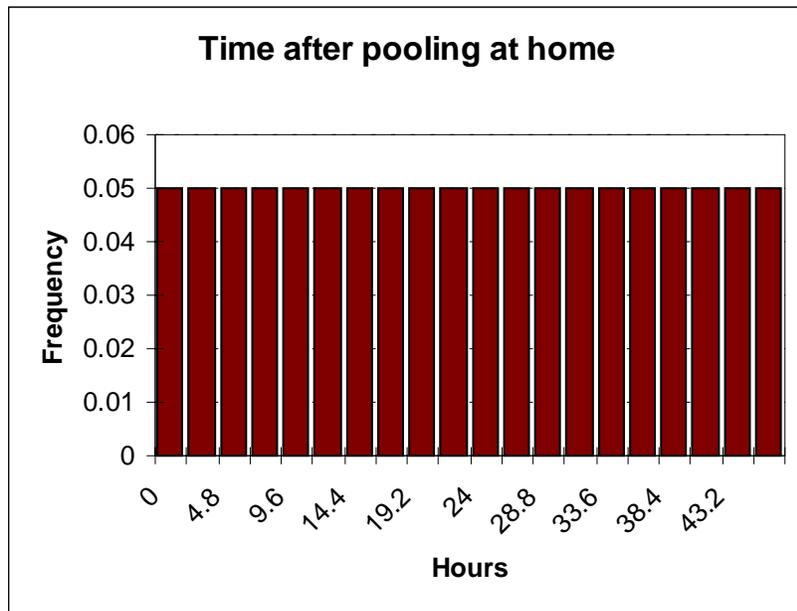
Preparation and Consumption Module

10. Storage time after pooling in home setting (hours)

- a. Evidence –
Personal experience
- b. Mean value of distribution – 24 hours
- c. Distribution – Uniform(0,48)

This distribution assumes that all eggs that are pooled in a home setting will be used within 48 hours. The time they will be used varies uniformly from 0 to 48 hours.

Figure D-10



Preparation and Consumption Module

11. Storage temperature after pooling in home setting (F)

a. Evidence –

Personal experience

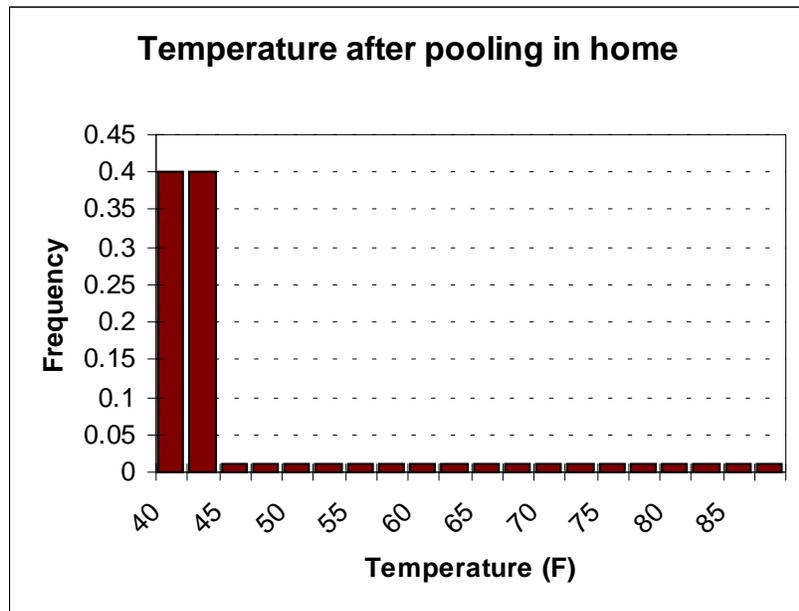
b. Mean value of distribution – 47.5° F.

It is assumed that most people, after breaking eggs out for pooling, store them under refrigeration at home, but that the probability of refrigeration adequate to prevent growth is lower.

c. Distribution – Discrete($\{\text{Uniform}(40,45), \text{Uniform}(45,90)\}, \{.8, .2\}$)

This distribution assumes that 80% of eggs are stored under refrigeration at temperatures ranging uniformly from 40-45° F and that 20% of eggs are stored unrefrigerated or poorly refrigerated at temperatures ranging from 45-90° F.

Figure D-11



Preparation and Consumption Module

12. Probability that a pooled egg in a home setting will be used as an egg

a. Evidence –

Personal experience

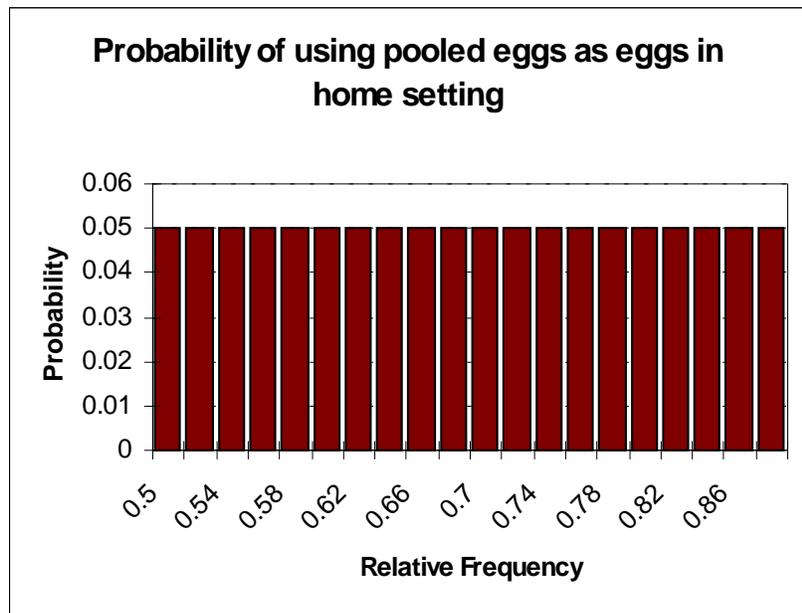
b. Mean value of distribution – 70%

It is assumed that over half the pooled eggs used in the home are consumed as eggs.

c. Distribution – Uniform(50%,90%)

The wide uniform distribution from 50 to 90% reflects the uncertainty of what the true value of this probability is.

Figure D-12



Preparation and Consumption Module

13. Probability that a pooled egg used as an egg in a home setting will be undercooked

a. Evidence –

The 1996-1997 Food Consumption and Preparation Diary (FCPD) Survey shows that 27% of all egg dishes consumed were undercooked (described as being runny or having either a runny yolk or runny white). On average, each person consumed undercooked eggs 19 times a year. (Lin et al., 1997).

Per capita table egg consumption for 1996 and 1997 was estimated to be about 168 and 164 eggs respectively. (Food and Agricultural Policy Research Institute (FAPRI) Staff Report – 1995)

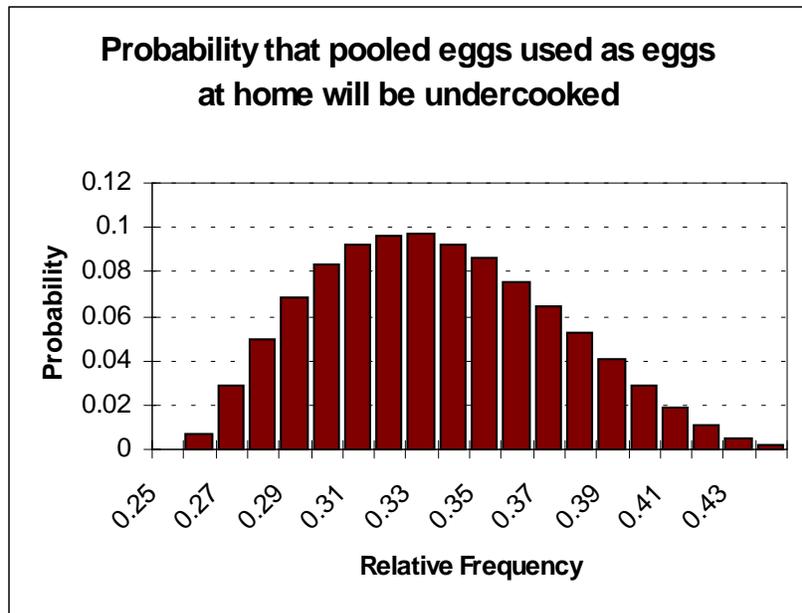
b. Mean value of distribution – 33%

Assume that an average egg dish consists of two eggs. In the section on the percentage of home use non-pooled eggs that are used as eggs, these were 70% of homes use non-pooled eggs. This value had a distribution ranging uniformly from 50 to 90%. 33% is obtained by multiplying 2 eggs per egg dish by 19 egg dishes for 38 undercooked eggs. This is divided by (166 eggs times 70%) 116 eggs for 33%.

c. Distribution – Pert(26%,33%,46%)

The minimum and maximum of the distribution are obtained by assuming that respectively 90% and 50% of the home use non-pooled eggs are used as eggs.

Figure D-13



Preparation and Consumption Module

14. Probability that a pooled egg used as an ingredient in a home setting will not be cooked

a. Evidence –

FDA Food Safety Survey from December 1992 through February 1993 (1,620 respondents) showed that 879 (53%) ate foods containing raw eggs at some time, 700 (44%) did not, and 41 (3%) were not sure. (Klontz et al., 1995). The Menu Census Survey (1992-1995) showed that the average frequency was 0.43 raw egg consumption events per year. (Lin et al., 1997; Market Research Corporation of America, 1995.)

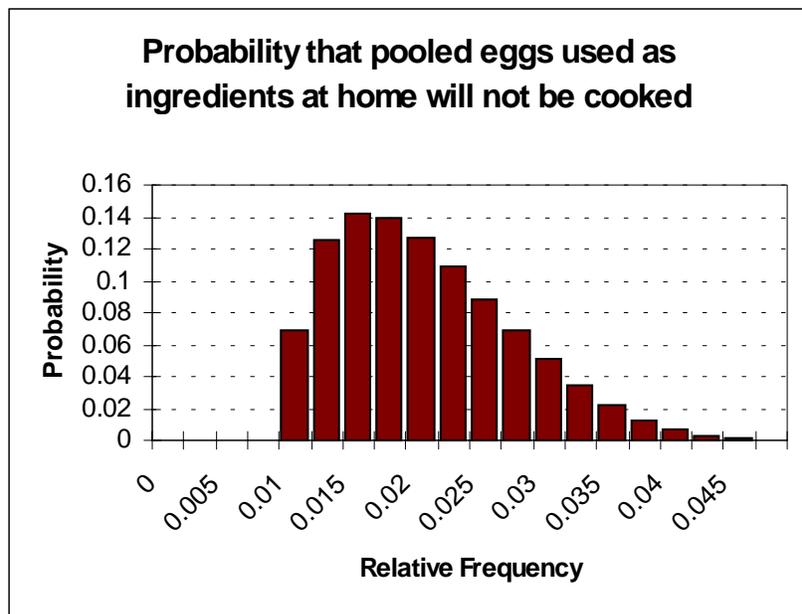
b. Mean value of distribution – 1.7%

In section 22, “Non-pooled eggs that are used as eggs in a home setting”, we assumed these were 70% of home use non-pooled eggs. This value had a distribution ranging uniformly from 50 to 90%. Thus 10-50% of home use non-pooled eggs would be used as ingredients. About 50 eggs (166 eggs per capita – 116 eggs consumed as eggs) per capita would be used as ingredients. Assume an average of two eggs per use as ingredients. Thus, 0.43 from the survey listed under evidence becomes 0.86 raw egg consumption events. $0.86 \text{ eggs} / 50 \text{ eggs} = 1.7\%$

c. Distribution – Pert(1%,1.7%,5.1%)

The minimum and maximum of the distribution are obtained by assuming that respectively 50% and 10% of the home use non-pooled eggs are used as eggs.

Figure D-14



Preparation and Consumption Module

15. Probability of pooling in an institutional setting

a. Evidence –

Personal experience

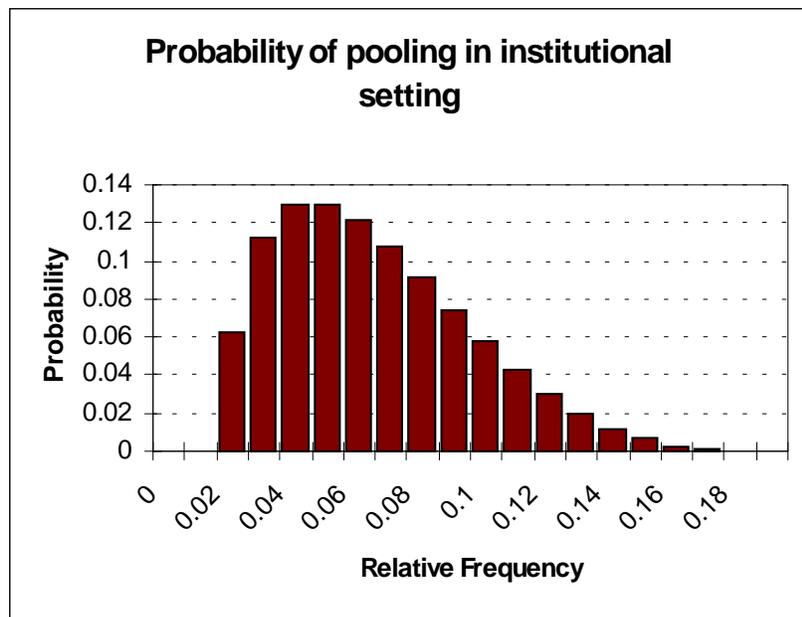
b. Mean value of distribution – 7%

It is assumed that pooling of eggs is more likely in an institutional setting than at home.

c. Distribution – Pert(2%,5%,20%)

It is assumed that the probability of pooling eggs in an institutional setting can range from 2-20% with half the values falling below 7%.

Figure D-15



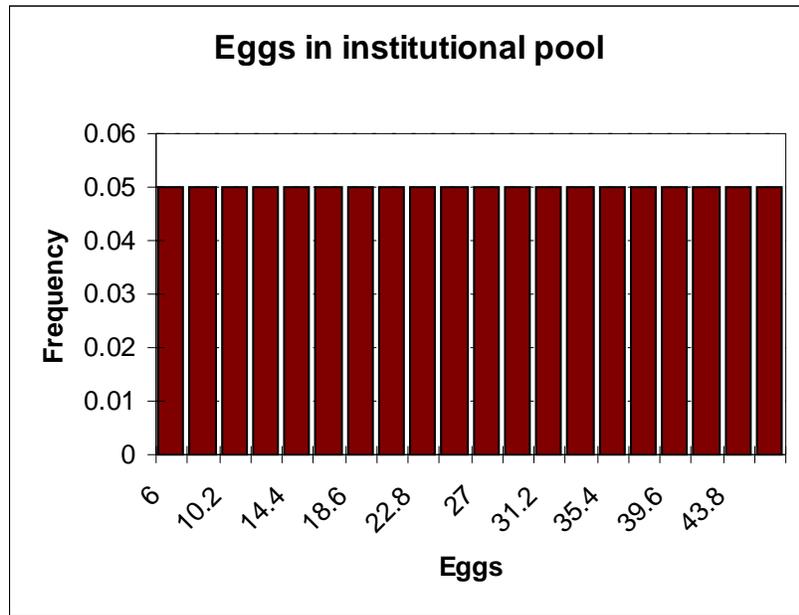
Preparation and Consumption Module

16. Number of eggs in a pool in an institutional setting

- a. Evidence –
Personal experience
- b. Mean value of distribution – 27 eggs
- c. Distribution – Uniform(6,48)

It is assumed that the size of a pool of eggs in an institutional setting is 3 to 4 times larger than the size of a pool of eggs in a home setting.

Figure D-16



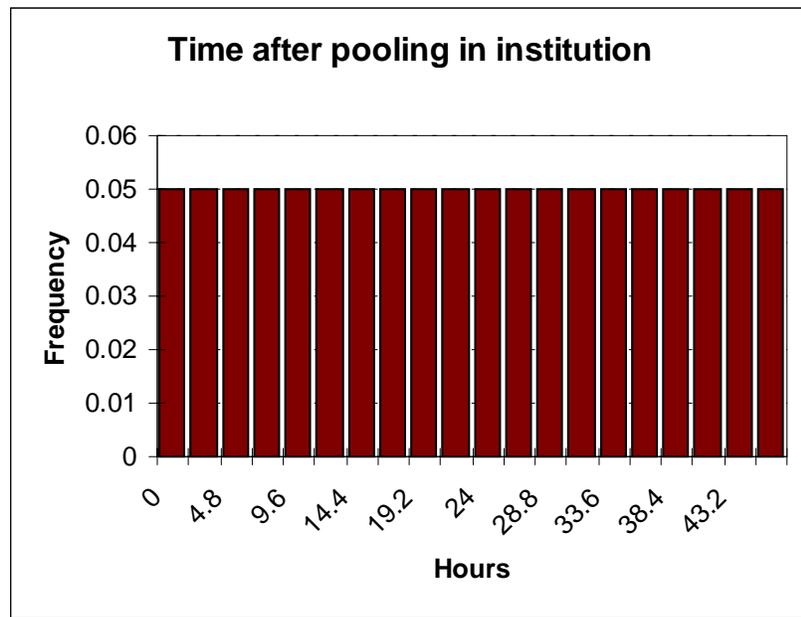
Preparation and Consumption Module

17. Storage time after pooling in an institutional setting (hours)

- a. Evidence –
Personal experience
- b. Mean value of distribution – 24 hours
- c. Distribution – Uniform(0,48)

This distribution assumes that all eggs that are pooled in an institutional setting will be used within 48 hours. The time they will be used varies uniformly from 0 to 48 hours.

Figure D-17



Preparation and Consumption Module

18. Storage temperature after pooling in an institutional setting (F)

a. Evidence –

Personal experience

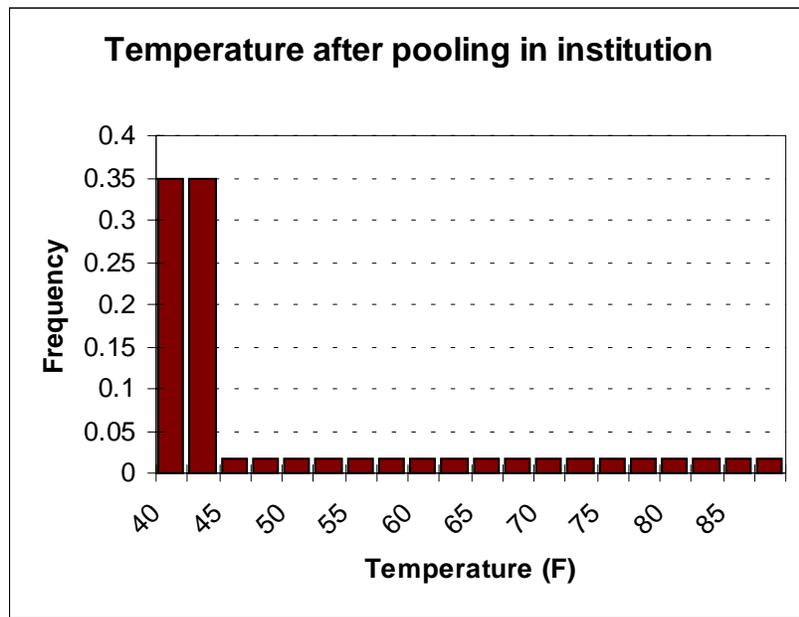
b. Mean value of distribution – 50° F.

It is less likely for institutional eggs to be refrigerated after they are broken out and pooled than for home use eggs.

c. Distribution – Discrete($\{\text{Uniform}(40,45), \text{Uniform}(45,90)\}, \{.7, .3\}$)

This distribution assumes that 70% of eggs are stored under refrigeration at temperatures ranging uniformly from 40-45° F and that 30% of eggs are stored unrefrigerated or poorly refrigerated at temperatures ranging from 45-90° F.

Figure D-18



Preparation and Consumption Module

19. Probability that a pooled egg will be used as an egg in an institutional setting

a. Evidence –

Personal experience

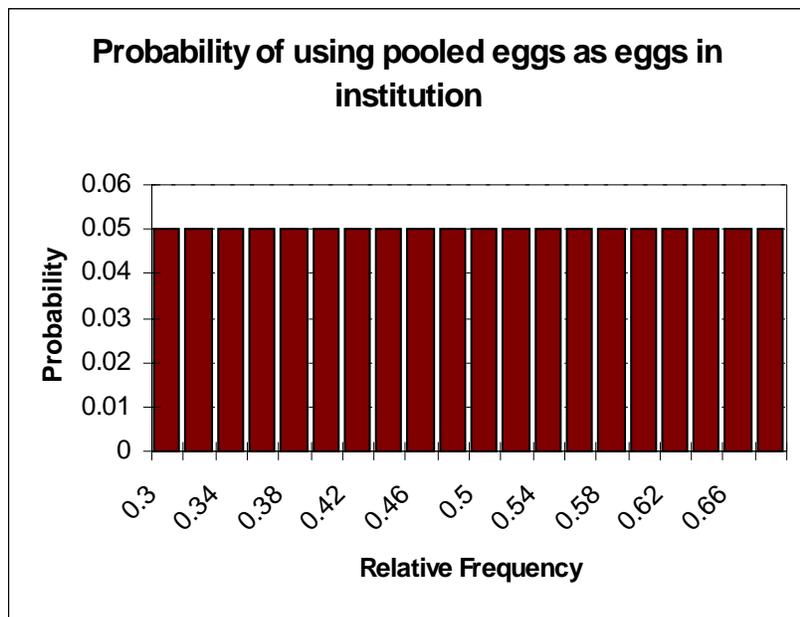
b. Mean value of distribution – 50%

It is assumed that about half the pooled eggs used in an institutional setting are consumed as eggs.

c. Distribution – Uniform(30%,70%)

The wide uniform distribution from 30 to 70% reflects the uncertainty of the probability of using of pooled eggs as eggs rather than ingredients.

Figure D-19



Preparation and Consumption Module

20. Probability that pooled egg used as an egg will be undercooked in an institutional setting

a. Evidence –

The 1996-1997 Food Consumption and Preparation Diary (FCPD) Survey shows that 27% of all egg dishes consumed were undercooked (described as being runny or having either a runny yolk or runny white). On average, each person consumed undercooked eggs 19 times a year. (Lin et al., 1997). Per capita table egg consumption for 1996 and 1997 was estimated to be about 168 and 164 eggs respectively. (FAPRI Staff Report – 1995)

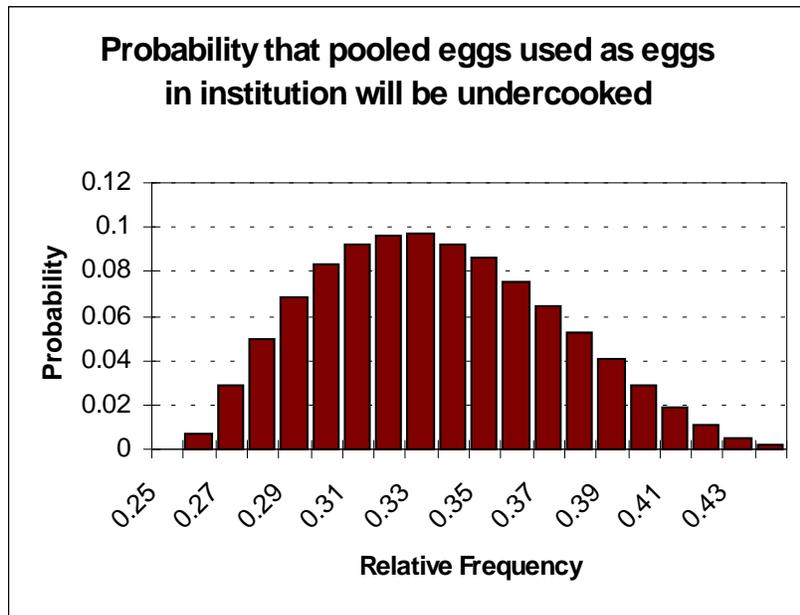
b. Mean value of distribution – 33%

It is assumed that the same percentage of these eggs will be undercooked in an institutional setting as was calculated for a home setting in variable number 13. Given the lack of information on cooking practices we treated all types of institutions as the same.

c. Distribution – Pert(26%,33%,46%)

It is assumed the same distribution for these eggs as was calculated for a home setting in variable number 13.

Figure D-20



Preparation and Consumption Module

21. Probability that pooled egg used as ingredient in an institutional setting will be uncooked

a. Evidence –

FDA Food Safety Survey from December 1992 through February 1993 (1,620 respondents) showed that 879 (53%) ate foods containing raw eggs at some time, 700 (44%) did not, and 41 (3%) were not sure. (Klontz et al., 1995).

The Menu Census Survey (1992-1995) showed that the average frequency of raw egg consumption was 0.43 consumption events per year. (Lin et al., 1997; Market Research Corporation of America, 1995.)

Personal experience

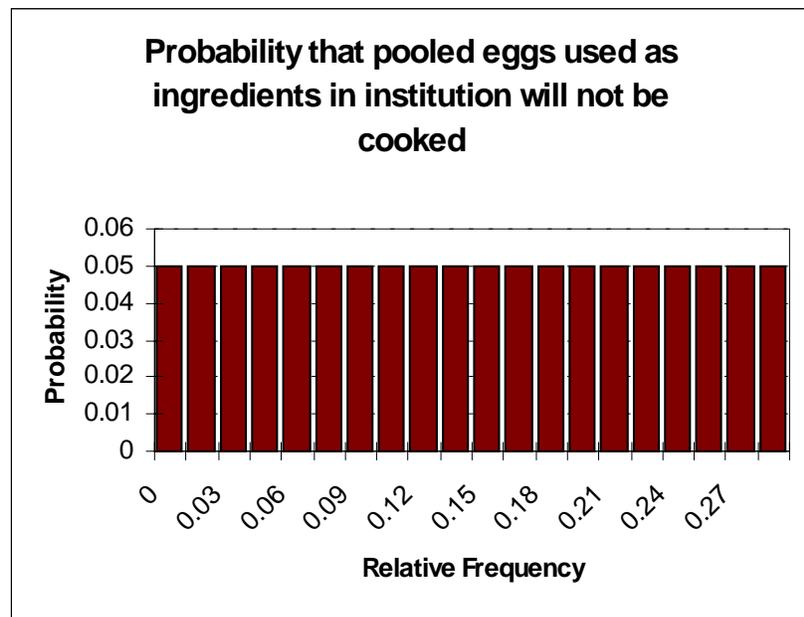
b. Mean value of distribution – 15%

This variable was set higher than other variables of the same type with the same evidence. There is more uncertainty regarding the true number of eggs used as ingredients in institutions that do not get cooked.

c. Distribution – Uniform(0,30)

This variable also has a much wider distribution than other similar variables in this module.

Figure D-21



Preparation and Consumption Module

Non-pooled Egg Variables

22. Probability that non-pooled egg will be used as egg in a home setting

a. Evidence –

Personal experience

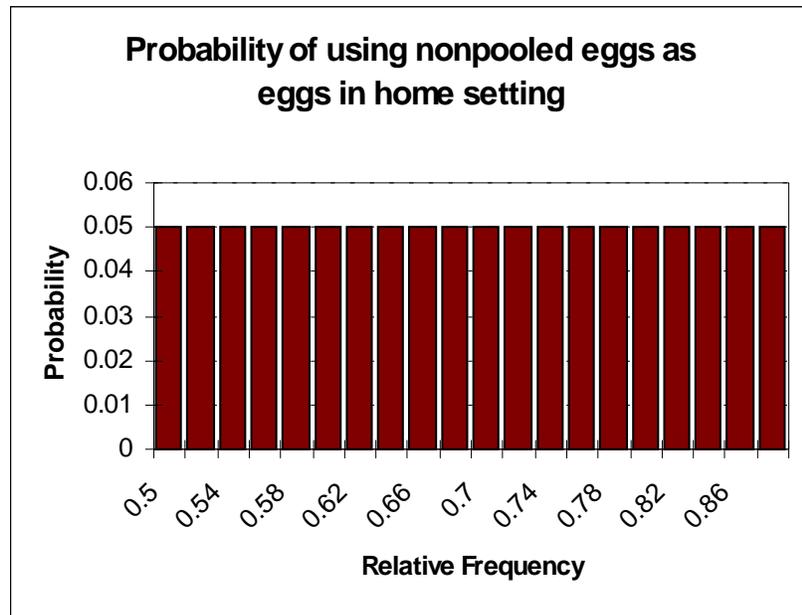
b. Mean value of distribution – 70%

It is assumed that most eggs used in the home are consumed as eggs.

c. Distribution – Uniform(50%,90%)

The wide uniform distribution from 50 to 90% reflects the uncertainty of probability of using non-pooled eggs as eggs.

Figure D-22



Preparation and Consumption Module

23. Probability that home use non-pooled egg used as egg will be undercooked

a. Evidence –

The 1996-1997 Food Consumption and Preparation Diary (FCPD) Survey shows that 27% of all egg dishes consumed were undercooked (described as being runny or having either a runny yolk or runny white). On average, each person consumed undercooked eggs 19 times a year. (Lin et al., 1997).

Per capita table egg consumption for 1996 and 1997 was estimated to be about 168 and 164 eggs respectively. (FAPRI Staff Report – 1995)

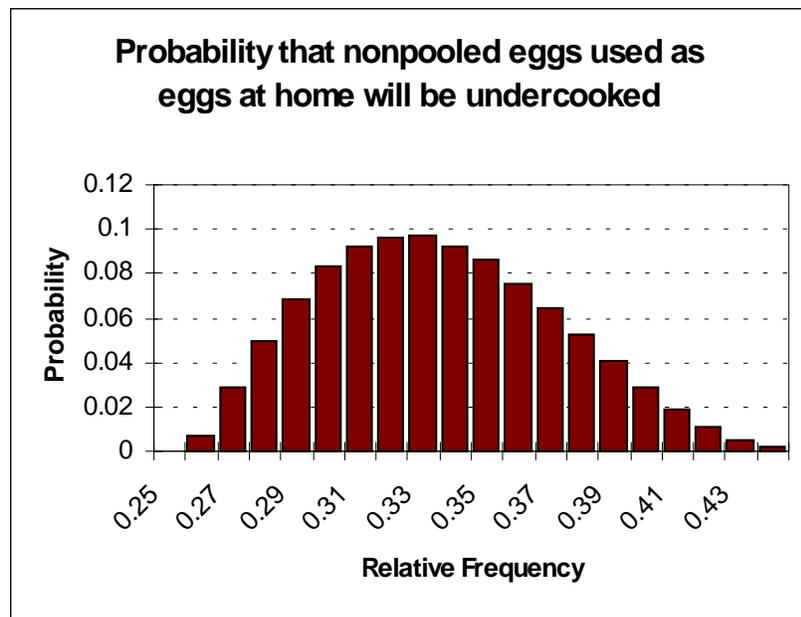
b. Mean value of distribution – 33%

It is assumed that the same percentage of these non-pooled eggs will be undercooked as was calculated for pooled eggs in a home setting in variable number 13.

c. Distribution – Pert(26%,33%,46%)

It is assumed the same distribution for these eggs as was calculated for pooled eggs in a home setting in variable number 13.

Figure D-23



Preparation and Consumption Module

24. Probability that non-pooled egg used as ingredient in a home setting will be uncooked

a. Evidence –

FDA Food Safety Survey from December 1992 through February 1993 (1,620 respondents) showed that 879 (53%) ate foods containing raw eggs at some time, 700 (44%) did not, and 41 (3%) were not sure. (Klontz et al., 1995). Menu Census Survey (1992-1995) showed that the average frequency of raw egg consumption was 0.43 consumption events per year. (Lin et al., 1997; Market Research Corporation of America, 1995.)

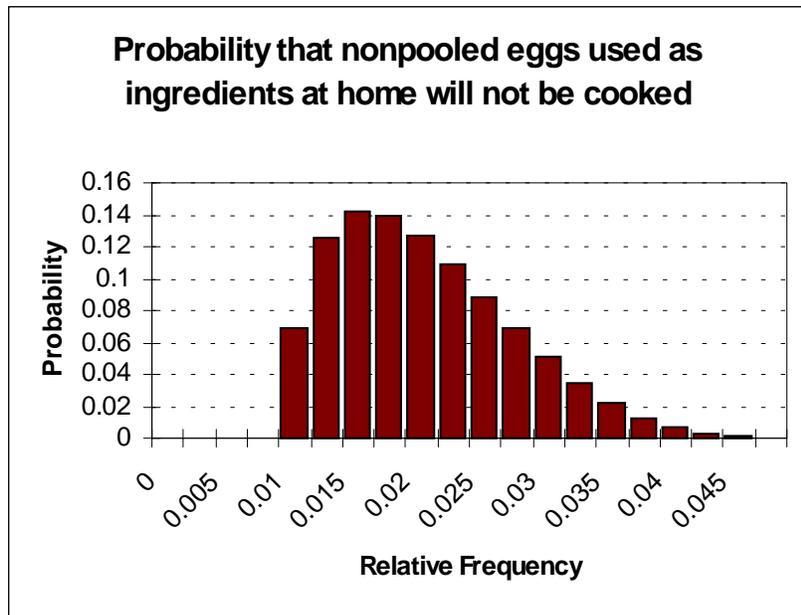
b. Mean value of distribution – 1.7%

It is assumed that 70% of home use non-pooled eggs are used as ingredients. This value had a distribution ranging uniformly from 50 to 90%. Thus 10-50% of home use non-pooled eggs would be used as ingredients. About 50 eggs (166 eggs per capita – 116 eggs consumed as eggs) per capita would be used as ingredients. Assume an average of two eggs per use as ingredients. Thus 0.43 consumption events becomes 0.86 raw egg consumption events. $0.86 \text{ eggs} / 50 \text{ eggs} = 1.7\%$

c. Distribution – Pert(1%,1.7%,5.1%)

The minimum and maximum of the distribution are obtained by assuming that respectively 50% and 10% of the home use non-pooled eggs are used as eggs.

Figure D-24



Preparation and Consumption Module

25. Number of servings in a home setting when eggs are used as an ingredient

a. Evidence –

Recipes from a single computerized recipe program (Recipe Wizard) were examined. Of 552 recipes, 129 contained eggs. The number of servings in each of the egg containing recipes were tabulated.

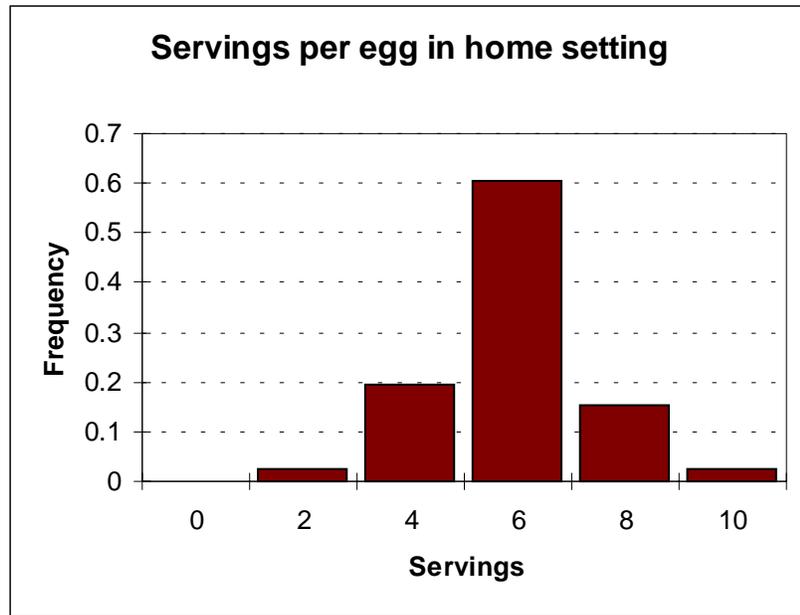
Table D-2. Recipes Containing Eggs		
Number of Servings	Number of Recipes	Percent of Recipes
2	3	2.33%
4	25	19.38%
6	78	60.47%
8	19	14.73%
9	1	0.78%
10	3	2.33%
Total	129	100.00%

b. Mean value of distribution – 6 servings

c. Distribution –

Discrete({2,4,6,8,9,10},{0.02,0.19,0.61,0.15,0.01,0.02})

Figure D-25



Preparation and Consumption Module

26. Percent of nonpooled institutional eggs used as eggs

a. Evidence –

Personal experience

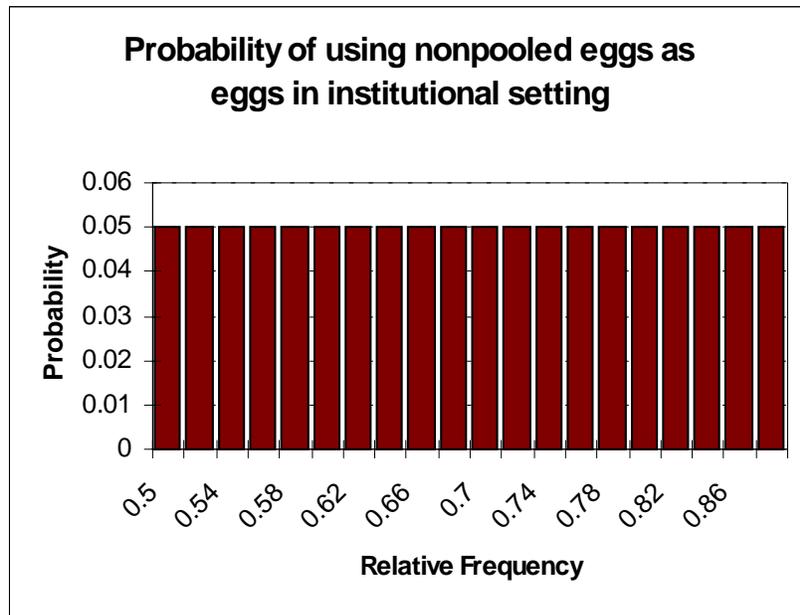
b. Mean value of distribution – 70%

It is assumed that most nonpooled eggs used in an institutional setting are consumed as eggs.

c. Distribution – Uniform(50%,90%)

The wide uniform distribution from 50 to 90% reflects the uncertainty of the probability of using nonpooled eggs as eggs.

Figure D-26



Preparation and Consumption Module

27. Probability that a non-pooled egg used as egg will be undercooked in an institutional setting

a. Evidence –

The 1996-1997 Food Consumption and Preparation Diary (FCPD) Survey shows that 27% of all egg dishes consumed were undercooked (described as being runny or having either a runny yolk or runny white). On average, each person consumed undercooked eggs 19 times a year. (Lin et al., 1997).

Per capita table egg consumption for 1996 and 1997 was estimated to be about 168 and 164 eggs respectively. (FAPRI Staff Report – 1995)

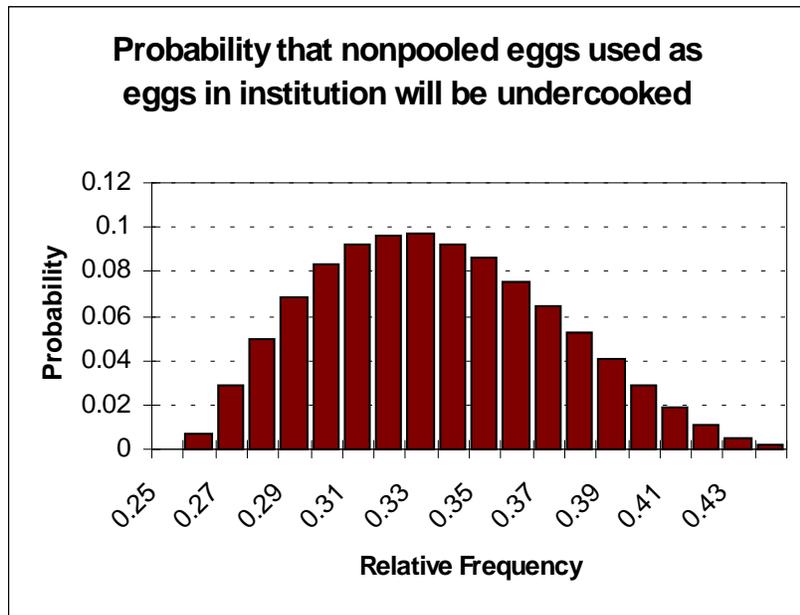
b. Mean value of distribution – 33%

It is assumed that the same percentage of these non-pooled eggs will be undercooked as we calculated for pooled eggs in a home setting in variable number 13.

c. Distribution – Pert(26%,33%,46%)

Assume the same distribution for these eggs as was calculated for pooled eggs in a home setting in variable number 13.

Figure D-27



Preparation and Consumption Module

28. Probability that nonpooled egg used as ingredient will not be cooked in an institutional setting

a. Evidence –

FDA Food Safety Survey from December 1992 through February 1993 (1,620 respondents) showed that 879 (53%) ate foods containing raw eggs at some time, 700 (44%) did not, and 41 (3%) were not sure. (Klontz et al., 1995).

Menu Census Survey (1992-1995) showed that the average frequency of raw egg consumption was 0.43 consumption events per year. (Lin et al., 1997; Market Research Corporation of America, 1995).

Personal experience

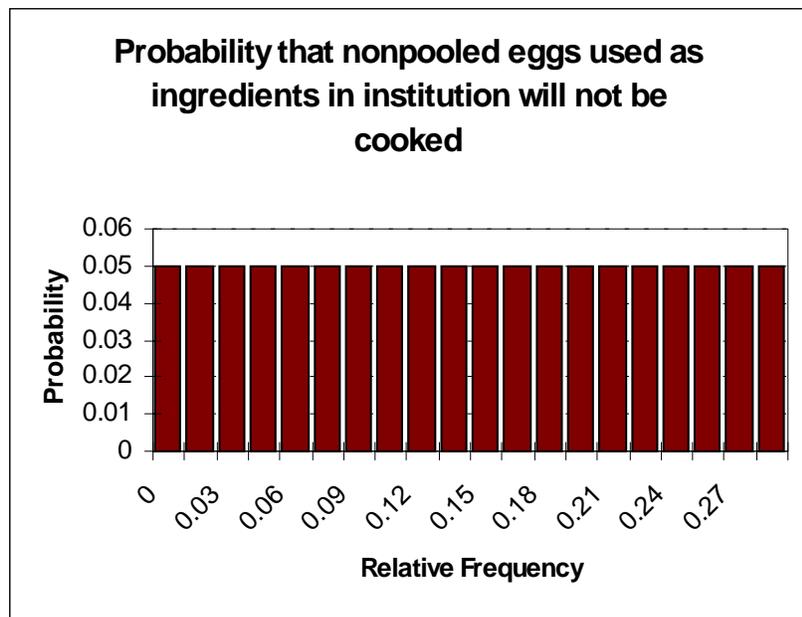
b. Mean value of distribution – 15%

This variable was set higher than other variables of the same type with the same evidence. There is more uncertainty regarding the true number of eggs used as ingredients in institutions that do not get cooked.

c. Distribution – Uniform(0,30)

This variable also has a much wider distribution than other similar variables in this module.

Figure D-28



Preparation and Consumption Module

29. Number of servings when eggs are used as ingredients in an institutional setting

a. Evidence –

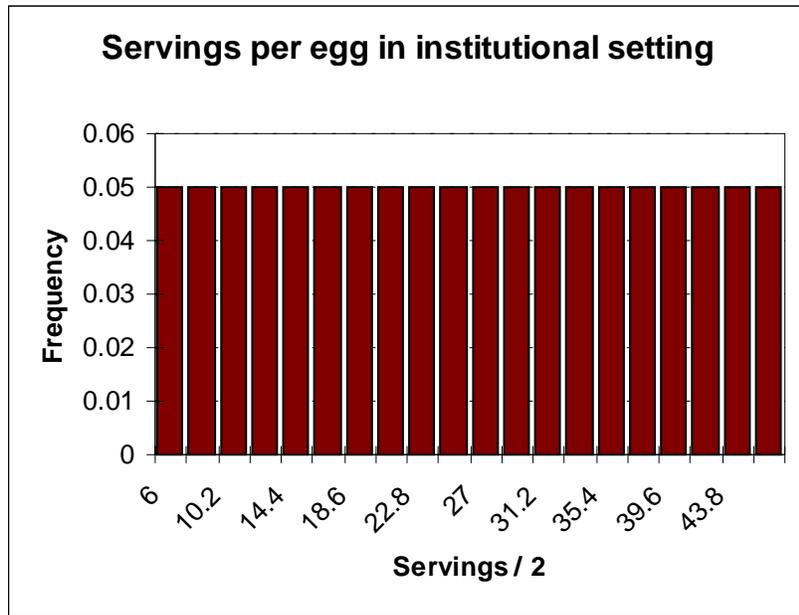
Personal experience

b. Mean value of distribution – 54

c. Distribution – $2 * \text{ROUND}(\text{Uniform}(6,48),0)$

Assume that the number of servings in an institutional setting will range from 12 to 96.

Figure D-29



Preparation and Consumption Module

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Preparation and Consumption Module

Bacterial Death Variables

30. Bacterial death in thoroughly cooked eggs served as eggs

a. Evidence –

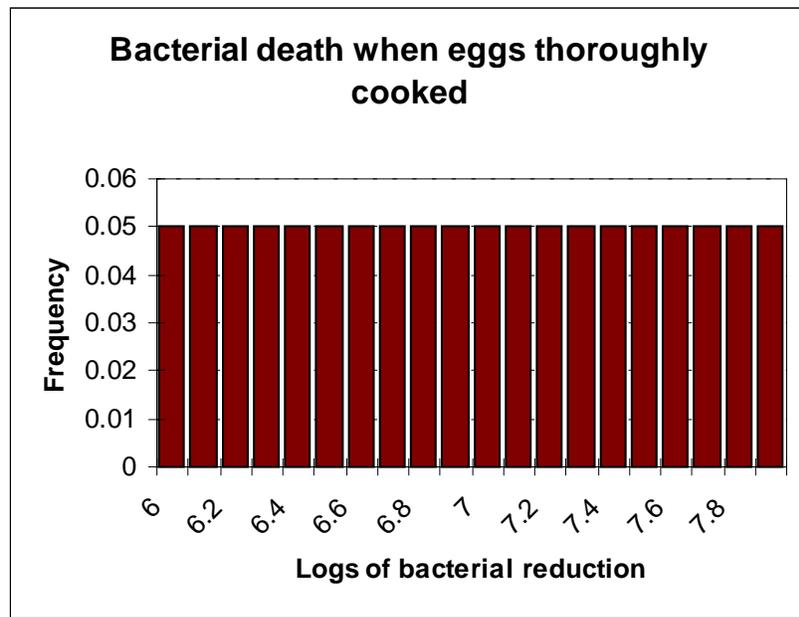
Humphrey (1989) reported that in eggs where the number of cells exceeded 10^8 per gram of yolk, viable cells could be recovered from eggs cooked in any manner

b. Mean value of distribution – 7 logs

Assume that thorough cooking provides about a 7 log decrease in bacterial numbers.

c. Distribution – Uniform(6,8)

Figure D-30



Preparation and Consumption Module

31. Bacterial death in undercooked eggs

a. Evidence –

Table D-3. Thermal Death Rates for *Salmonella Enteritidis*

(Humphrey et al., 1989)

Method of Cooking	Cooking Time (minutes - minimum)	Mean Inoculum (log cfu/gm yolk)	Mean number of survivors (cfu/gm yolk)	Mean yolk temperature post cooking (Centigrade)
Boiling¹	4	6.81	5.87	54.6
Frying sunny side up²	1.6	6.90	5.14	55.2
Frying over easy²	2.4	6.88	--	67.7
Scrambled³	1.2	6.09	--	82.8
	3.1	5.9	--	73.9

¹ Includes *S. Enteritidis* PT4 and *S. Typhimurium* PT110 and PT141 results.

² Eggs fried in vegetable oil at approximately 120° C until white appeared solid and opaque. Sunny side up eggs were cooked approximately 1.5 to 2 minutes. Over easy eggs were cooked for up to 1 minute longer.

³ Includes *S. Enteritidis* PT4, PT8 and PT13a, and *S. Typhimurium* PT110 and PT141.

The 1996-1997 Food Consumption and Preparation Diary (FCPD) Survey shows that 27% of all egg dishes consumed were undercooked (described as being runny or having either a runny yolk or runny white). Undercooked preparation of eggs was primarily in the fried egg category (49%) but other styles were sometimes undercooked as well, including scrambled eggs and omelettes (29%), poached eggs (13%), soft boiled eggs (7%) and hard boiled eggs (2%) (Lin et al., 1997).

b. Mean value of distribution – 3.8 logs

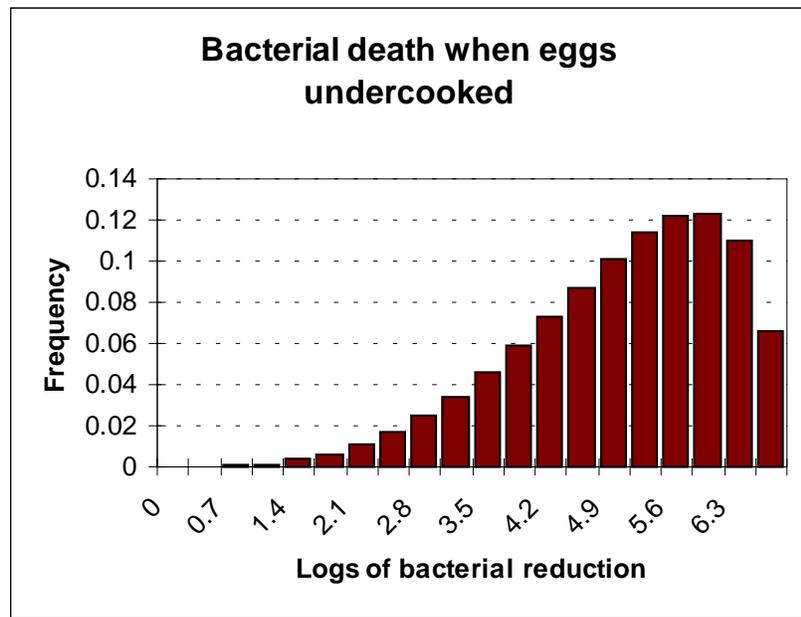
Preparation and Consumption Module

c. Distribution –

Discrete($\{\text{Pert}(0,1,7), \text{Pert}(0,4,7), \text{Pert}(0,6,7)\}, \{.22, .49, .29\}$)

The log reductions for boiling, frying, and scrambling are set to vary from 0 to 7. Boiled eggs (poached eggs, soft boiled eggs, hard boiled eggs) account for 22% of the total undercooked eggs. The most likely value for undercooked boiled eggs is set at 1 which is consistent with Humphrey's observations with eggs boiled for four minutes. Fried eggs account for 49% of the total. The most likely value is set at 4 which is the average of the log reductions observed for frying over easy and sunny side up. Scrambled eggs account for 29% of the total.

Figure D-31



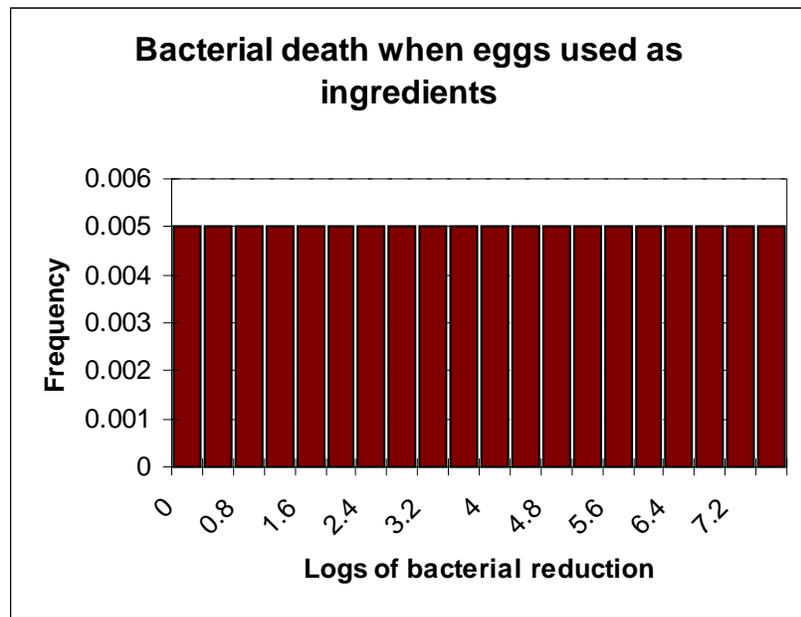
Preparation and Consumption Module

32. Bacterial death when eggs are used as ingredients

- a. Evidence –
Personal experience
- b. Mean value of distribution – 4 logs
- c. Distribution – Uniform(0,8)

Assume that when eggs are used as ingredients the final products are subjected to a wide range of cooking temperatures and times. Assumed in this distribution that anywhere from very few to almost all bacteria will be killed as a result of cooking.

Figure D-32



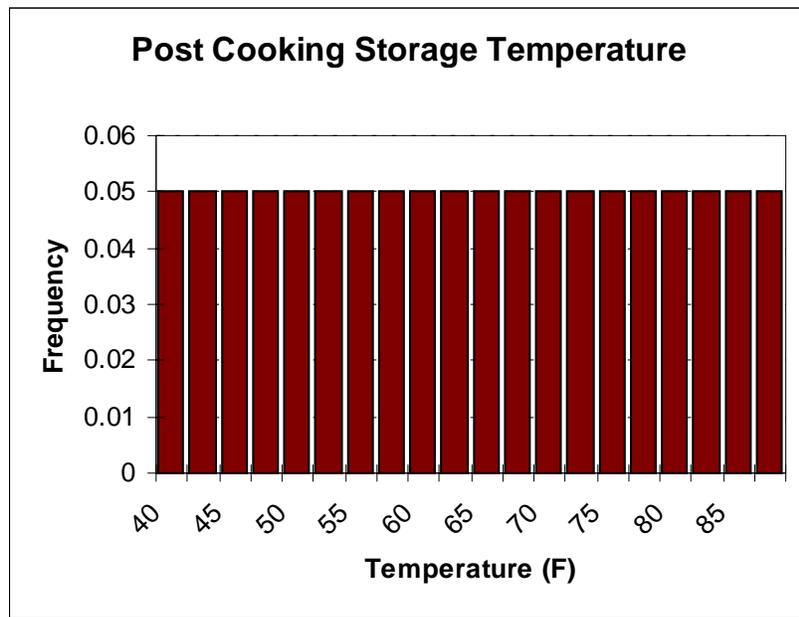
Preparation and Consumption Module

Post Cooking Storage Time and Temperature Variables

33. Post cooking storage temperature for cooked eggs and egg products in the home and in institutions
- Evidence –
Personal experience
 - Mean value of distribution – 65° F.
 - Distribution – Uniform(40,90)

Assume that these products may or may not be refrigerated after cooking and stored at temperatures ranging from 40° to 90° F.

Figure D-33



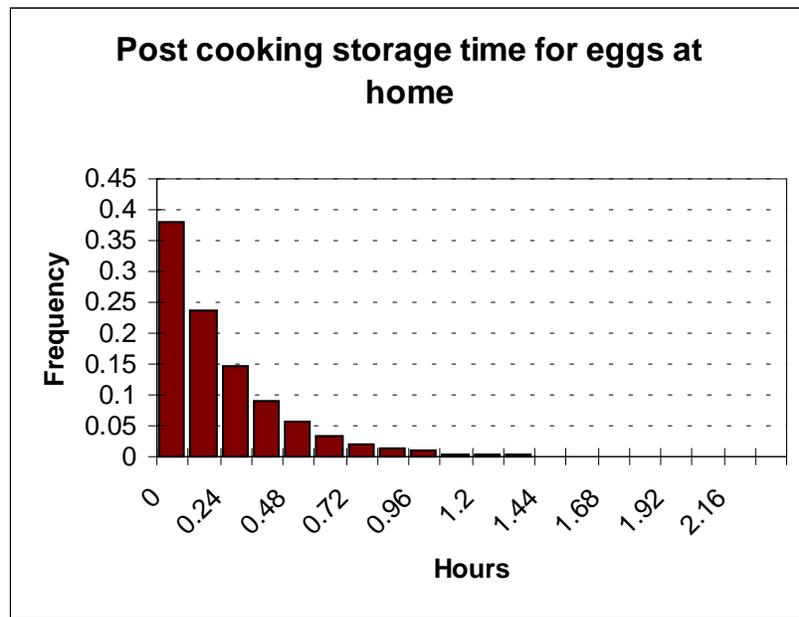
Preparation and Consumption Module

34. Post cooking storage time for cooked eggs in the home

- a. Evidence –
Personal experience
- b. Mean value of distribution – 15 minutes
- c. Distribution – Exponential(0.25 hours)

Assume that most home cooked eggs will be consumed very shortly after cooking.

Figure D-34



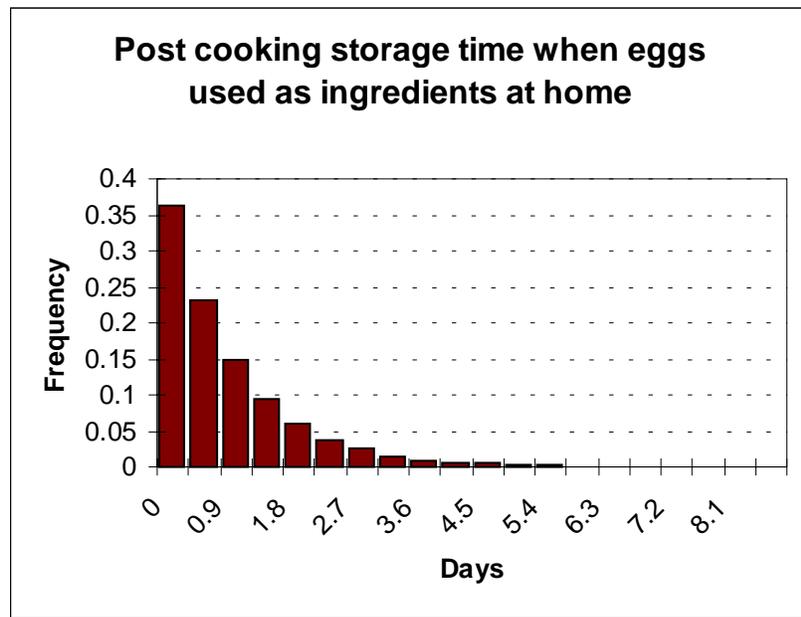
Preparation and Consumption Module

35. Post cooking storage time for home cooked egg containing products

- a. Evidence –
Personal experience
- b. Mean value of distribution – 1 day
- c. Distribution – Exponential(1 day)

Assume that most home cooked products containing eggs will be consumed very shortly after cooking.

Figure D-35



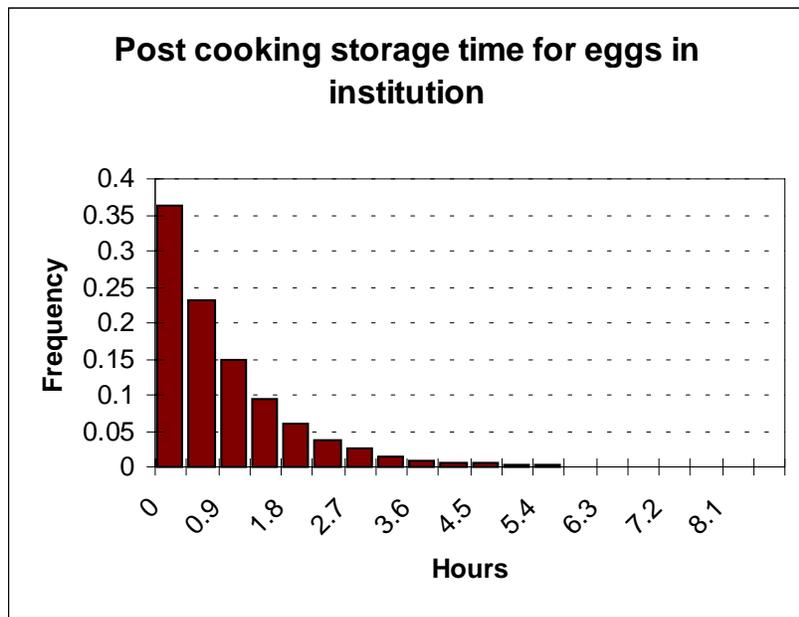
Preparation and Consumption Module

36. Post cooking storage time for cooked eggs in an institution

- a. Evidence –
Personal experience
- b. Mean value of distribution – 1 hour
- c. Distribution – Exponential(1 hour)

Assume that most institutional eggs will be consumed very shortly after cooking (within 45 minutes) but that, on average, they will be stored longer than eggs cooked in the home.

Figure D-36



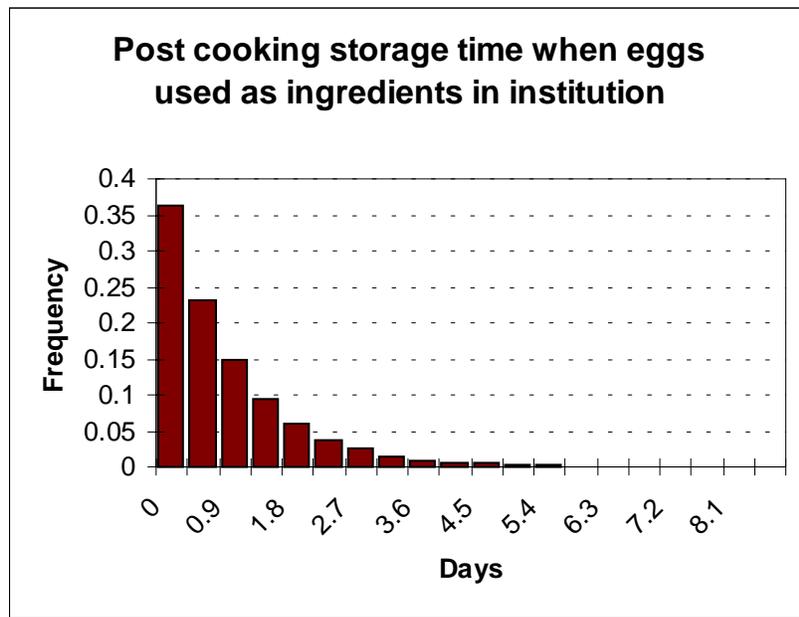
Preparation and Consumption Module

37. Post cooking storage time for institutional cooked egg containing products

- a. Evidence –
Personal experience
- b. Mean value of distribution – 1 day
- c. Distribution – Exponential(1 day)

The assumption is made that most products containing eggs and cooked in an institution will be consumed very shortly after cooking.

Figure D-37



Preparation and Consumption Module

D. Results

The Preparation and Consumption Module was simulated using Latin Hypercube sampling in @Risk® for Excel®. Although the module results feed directly into the public health output calculations some conclusions can be drawn from the model output.

Most servings prepared with SE positive eggs have no SE in them at consumption. Of the mean 10.1 million servings prepared with positive eggs, 76% have no SE bacteria in them at consumption.

Most eggs (70%) end up in only one serving. Nevertheless, some eggs are used to make products that serve more than one person. In institutional feeding one egg may end up in a product that feeds one hundred or more people. This both dilutes the number of bacteria per serving and increases the number of people exposed. The mean number of servings was 4.4. This means that each contaminated egg could potentially expose an average of four people.

E. Sensitivity analysis

Due to the structure of this module sensitivity analysis was not performed directly on the module inputs. These outputs feed directly into the public health calculations. Thus the sensitivity of the inputs is proxied by calculating mitigation elasticities with model outputs for variables of interest.

Preparation and Consumption Module

F. References

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