Example A5:

How Many Breeding Females are Needed to Produce 40 Male Homozygotes per Week Using a Heterozygous Female x Heterozygous Male Breeding Scheme With 15% Non-Productive Breeders?

Strain characteristics

Breeding scheme	Heterozygote x heterozygote
Breeding lifespan	32 weeks
Number of Litters Produced	4 litters
Litter frequency	1 litter/8 weeks
Percent Non-productive breeders	15%
Litter size	6 pups (3 females, 3 males)
Offspring Genotypes	25% Homozygotes, 50% Heterozygotes, 25% Wild-type
Percent Useful Offspring	0.25 homozygotes x 0.50 males x .85 productive breeders = ~ .1

Number of experimental mice needed

1.	**Number of mice needed**	**40**
2.	**Age requirements**	
	If must be same age, enter 1	
	If can have a 2-week age range (e.g., 5-6 weeks old), enter 2	
	If can have a 4-week age range (e.g., 5–8 weeks old), enter 4	**1**
3.	**Frequency with which mice are needed**	
	If weekly, enter 1	
	If every other week, enter 2	
	If once a month, enter 4	**1**
4.	**Divide Line 3 by Line 2 (round to nearest whole number)**	**1**
5.	**Sexes needed**	
	If both sexes needed, enter 1	
	If one sex needed, enter 2	**1**
6.	**Breeding scheme**	
	If homozygote x homozygote, enter 1	
	If heterozygote x homozygote, enter 2	
	If heterozygote x heterozygote, enter 4	**4**
7.	**Some surplus (insurance) mice desired**	
	If no, enter 1	
	If yes, enter a "fudge factor" to ensure overproduction	
	(e.g., if 10% more mice are desired, enter 1.1)	**1.1**
8.	**Number of mice to be produced weekly**	
	Multiply Lines 1 x 4 x 5 x 6 x 7 (round to nearest whole number)	**352**

Colony productivity

9.	**Average number of pups weaned per litter**	**6**
10.	**Average number of litters produced per breeder female**	
	Because 15% of the breeders are non-productive, multiply the litters per productive female by 0.85.	**3.4**
11.	**Average productive female's breeding lifespan (weeks)**	**32**
12.	**Calculate colony productivity**	
	Divide Line 10 by Line 11, multiply by Line 9 (round to nearest hundredth)	**0.64**
13.	**Calculate number of breeding females needed**	
	Divide Line 8 by Line 12 (round to nearest whole number)	**550**

Number of breeding females needed to keep colony productive

14.	**Calculate number of replacement breeders needed per week**	
	Divide Line 13 by Line 11 (round up to nearest whole number)	**18**
15.	**Calculate the number of additional breeders needed to provide replacement breeders**	
	Divide Line 14 by Line 12 (round up to nearest whole number)	**28**

Total number of breeders needed

16.	**Add Line 13 and Line 15**	
	Note: Approximately 176 heterozygous females and males per week not used for experiments but useful for breeding will be produced. Therefore, breeding colony size need not be adjusted/increased to produce replacement breeders.	**578**

Number of cages needed per week

17.	**Breeding cages**	
	For pair breeding (one breeding female per cage): – **32 cages needed**	
	or trio breeding (two breeding females per cage): –**16 cages needed**	
18.	**Weaning cages**	
	~11 females & ~11 males weaned per week will require ~ **6 cages** (5 animals per cage separated by sex)	