What we know.

85 million dutch pigs were tested in 7 years 2007 - 2013.

No pig have been tested positive in the period.

What we want to know

Say 10 million pigs will be tested next year.

What is the chance that no pig will be tested positive?

Answers

89.5%

More answers

What is the chance that exactly 1 pig will be tested positive?

9.4 %

What is the chance that exactly 2 pig will be tested positive?

1 %

Appendix

Number of positive pigs out of n pigs tested is a Beta binomial random variable.

Assume uniform priors. Observing no positive test, we set α = 1.

```
D = BetaBinomialDistribution[1, β, n]
```

```
BetaBinomialDistribution[1, β, n]
```

Look at the first 6 possibilities.

```
pd = Table[FunctionExpand@PDF[D, x], {x, 0, 5}]
```

$$\left\{\begin{cases} \frac{\beta}{n+\beta} & 0 \le n \\ 0 & \text{True} \end{cases}, \begin{cases} \frac{n\,\beta}{(-1+n+\beta)\,(n+\beta)} & 1 \le n \\ 0 & \text{True} \end{cases}, \begin{cases} \frac{(-1+n)\,n\,\beta}{(-2+n+\beta)\,(-1+n+\beta)\,(n+\beta)} & 2 \le n \\ 0 & \text{True} \end{cases},\right.$$

$$\left.\begin{cases} \frac{(-2+n)\,(-1+n)\,n\,\beta}{(-3+n+\beta)\,(-2+n+\beta)\,(-1+n+\beta)\,(n+\beta)} & 3 \le n \\ 0 & \text{True} \end{cases}, \begin{cases} \frac{(-3+n)\,(-2+n)\,(-1+n)\,n\,\beta}{(-4+n+\beta)\,(-3+n+\beta)\,(-2+n+\beta)\,(-1+n+\beta)\,(n+\beta)} & 4 \le n \\ 0 & \text{True} \end{cases},\right.$$

$$\left.\begin{cases} \frac{(-4+n)\,(-3+n)\,(-2+n)\,(-1+n)\,n\,\beta}{(-5+n+\beta)\,(-4+n+\beta)\,(-3+n+\beta)\,(-2+n+\beta)\,(-1+n+\beta)\,(n+\beta)} & 5 \le n \\ 0 & \text{True} \end{cases}\right\}$$

8539844 pigs were tested in the Netherlands.

Ten million pigs will be tested next year.

```
npd = pd /. {β → 1 + 8 539 844, n → 10^7};
```

The first 6 possibilities would happen with the following probabilities.

```
100.0 npd
```

```
{89.5169, 9.38413, 0.983745, 0.103127, 0.0108109, 0.00113331}
```