Bayes Rule is the probability of A given B equals the probability of B given A, times the probability of A, divided by the probability of B or:

$P(A \mid B) = P(B \mid A) * P(A) / P(B)$

First Try

Initially your chance of picking the prize winning door is 1 in 3 or 0.33. By Bayes Rule this changes when the non-winning door as follows.

A ⇒ "car" door picked
B ⇒ "goat" door picked

P(A|B) = 1.00 x 0.50 / 1.00 = 0.50.

Wrong Answer. OK, I did not think that one through. I briefly scanned the wikipedia article. I will define some terms to help my logic.

Second Try

The state of the doors, if the door is open the probability of car becomes either 0.00 or 1.00.

probability door 1 (picked) is the "car"
probability door 2 (not picked) is the "car"
probability door 3 (revealed) is the "car"

Monte won't reveal the "car" door because then there is no "choice" for the contestant.

	Contestant Picks	Monte Reveals
Door 1	closed (0.33)	closed (?)
Door 2	closed (0.33)	closed (?)
Door 3	closed (0.33)	open (0.00)

I think you could stop right here and take a leap of logic by saying that the chance there is a car is 1.00. The chance that door 1 is a car is unchanged after door 3 is revealed so it's still 0.33. P(Door 2) = P(car) - P(Door 1) = 1 - 1/3 = 2/3

Hopefully putting it in terms of Baynes Rule:

A - door 2 is car

B - host reveals door 3

P(A) = 1/3

P(B) = .1/2

P(B|A) = 1

P(A | B) = ½ * ⅓ / 1 = ⅔