

Supplementary Materials

Assessment of Influential Factors for Scours Associated with *Cryptosporidium* sp., Rotavirus and Coronavirus in Calves from Argentinean Dairy Farms

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Table S4. Statistics outputs of R.

Logistic regression procedure

The risk factor analysis was conducted using the Epical package (<http://cran.r-project.org>) in R Studio (Version 1.2.1335, © 2009-2019 RStudio, Inc.).

A first univariate screening of variables was conducted in order to identify them as risk factors associated to diarrhea, rotavirus infection and cp infection. The Epicalc function "cc" was applied, producing odds ratio, its 95% confidence interval, performing the Chi-squared (χ^2) tests and Fisher's exact tests. The 'cc' function uses the exact method to calculate the odds ratio (Epical Manual, <https://usermanual.wiki/Document/EpicalcBook.934243917/view>). Due to the low incidence of BCoV in the study population (2 calves positive) this variable was excluded from the analysis.

List of variables analyzed:

Case: diarrhea/healthy > calf with diarrhea or healthy calf at sampling.

HS: Herd size

Vac: Dam vaccination with vaccine to prevent calf scours

Tpc: Time of newborn in the calving pen

Do: Navel disinfection

Cna: Colostrum administration: traditional (natural) vs artificial

Vc: Volume of colostrum administered

Cb: Colostrum bank

Gua: Calf rearing system, grouped or individual

Ld: Type of liquid diet, raw milk or milk replacer

CN: Caretakers number

OT: Occupation time

CG: Caretaker gender

RVA: rotavirus

Cp: Cryptosporidium sp.

Age: Calf age

Univariate screening variables for scours

> cc(case, HS)

Variable case	HS: Herd size		
	small	median	large
Diarrhea	65	77	33
Healthy	124	161	28
Odds ratio	1	1.1	0.45
lower 95% CI		0.72	0.24
upper 95% CI		1.68	0.83
Chi-squared = 10.272 , 2 d.f., P value = 0.006			
Fisher's exact test (2-sided) P value = 0.007			

```
> cc(case, vac)
```

Variable case	VAC: Dam vaccination		
	YES	NO	total
Diarrhea	165	10	175
Healthy	285	28	313
Total	450	38	488
OR = 1.62	95%CI = 0.77; 3.42		
Chi-squared = 1.63, 1 d.f.,	P value = 0.201		
Fisher's exact test (2-sided)	P value = 0.222		

```
> cc(case, Tpc)
```

Variable case	Tpc: time of newborn in calving pen		
	<6h	>6h	total
Diarrhea	64	111	175
Healthy	82	231	313
Total	146	342	488
OR = 1.62	95%CI = 1.09, 2.42		

Chi-squared = 5.76, 1 d.f., P value = 0.016
Fisher's exact test (2-sided) P value = 0.018

> cc(case, Do)

Variable case	Do: navel disinfection		
	YES	NO	total
Diarrhea	142	33	175
Healthy	240	73	313
Total	382	106	488

OR = 1.31 95%CI = 0.83, 2.07

Chi-squared = 1.32, 1 d.f., P value = 0.251
Fisher's exact test (2-sided) P value = 0.303

> cc(case, cna)

Variable case	Cna: colostrum administration		
	Traditional (Natural)	Artifitial	total
Diarrhea	110	65	175
Healthy	201	112	313
Total	311	177	488

OR = 0.94 95% CI = 0.64, 1.38

Chi-squared = 0.09, 1 d.f., P value = 0.764
Fisher's exact test (2-sided) P value = 0.769

> cc(case, vc)

variable case	vc: volume of colostrum administered		
	unknow	<4L	>4L
Diarrhea	67	70	38
Healthy	124	138	51
Odds ratio	1	1.07	0.73
lower 95% CI		0.69	0.42
upper 95% CI		1.65	1.26

Chi-squared = 2.299 , 2 d.f., P value = 0.317

Fisher's exact test (2-sided) P value = 0.312

> cc(case, cb)

variable case	cb: colostrum bank		
	YES	NO	total
Diarrhea	103	72	175
Healthy	151	162	313
Total	254	234	488
OR = 1.53 95%CI = 1.06, 2.23			
Chi-squared = 5.07, 1 d.f., P value = 0.024			

Fisher's exact test (2-sided) P value = 0.030

> cc(case, gua)

Variable case	gua: calf rearing system		
	Grouped	individual	total
Diarrhea	77	98	175
Healthy	131	182	313
Total	208	280	488
OR = 1.09 95% CI = 0.75, 1.59			
Chi-squared = 0.21, 1 d.f., P value = 0.646			
Fisher's exact test (2-sided) P value = 0.703			

> cc(case, Ld)

Variable case	Ld: Type of liquid diet, raw milk or milk replacer		
	Raw milk	Milk replacer	total
Diarrhea	58	117	175
Healthy	140	173	313
Total	198	290	488
OR = 0.61 95% CI = 0.42, 0.9			
Chi-squared = 6.25, 1 d.f., P value = 0.012			
Fisher's exact test (2-sided) P value = 0.013			

> cc(case, CN)

Variable case	CN: Number of Caretakers		
	Raw milk	Milk replacer	total
Diarrhea	164	11	175
Healthy	297	16	313
Total	461	27	488

OR = 0.80 95% CI = 0.36, 1.77

Chi-squared = 0.3, 1 d.f., P value = 0.586

Fisher's exact test (2-sided) P value = 0.680

> cc(case, OT)

Variable case	OT: occupation time		
	Part-time	Full-time	Total
Diarrhea	87	88	175
Healthy	123	190	313
Total	210	278	488

OR = 1.53 95% CI = 1.05, 2.22

Chi-squared = 4.97, 1 d.f., P value = 0.026

Fisher's exact test (2-sided) P value = 0.029

> cc(case, CG)

Variable case	CG: caretaker gender		
	Male	Female	total
Diarrhea	125	50	175
Healthy	213	100	313
Total	338	150	488

OR = 1.17 95% CI = 0.78, 1.76

Chi-squared = 0.6, 1 d.f., P value = 0.438

Fisher's exact test (2-sided) P value = 0.475

```
> cc(case, RVA)
```

Variable case	RVA: rotavirus		
	positive	negative	total
Diarrhea	27	148	175
Healthy	19	294	313
Total	46	442	488

OR = 2.82 95% CI = .52, 5.24

Chi-squared = 11.51, 1 d.f., P value = 0.001

Fisher's exact test (2-sided) P value = 0.001

> cc(case, Cp)

Variable case	Cp: Cryptosporidium sp.		
	positive	negative	total
Diarrhea	64	111	175
Healthy	36	277	313
Total	100	388	488
OR = 4.44	95% CI = 2.79, 7.06		
Chi-squared = 43.3, 1 d.f.,	P value = 0		
Fisher's exact test (2-sided)	P value = 0		

> cc(case, Age)

Variable case	Age: Calf's age		
	[0,20]	(20,90]	total
Diarrhea	106	69	175
Healthy	120	193	313
Total	226	262	488
OR = 2.47	95% CI = 1.69, 3.61		
Chi-squared = 22.31, 1 d.f.,	P value = 0		
Fisher's exact test (2-sided)	P value = 0		

The variables with a $P < 0.2$ [11,26] in the univariate analysis were selected as explanatory effects for performing a Multivariable Logistic Regression (MLR) model where calf within farm was included in the model as a random effect. Using the Epicalc command “*logistic.display()*” a display showing the OR (95% CI), P(Wald's test) and P(LR-test) was obtained. For the interpretation of the results it was considered the P-value that the results from Wald's test which depend on the reference level of the explanatory variable with only two categories, while the P-value from LR-test was considered only in the analysis of the variables with three or more categories.

Logistic regression for the dependent variable scours

Case: diarrhea/healthy > calf with diarrhea or healthy calf at sampling.

HS: Herd size

Vac: Dam vaccination with vaccine to prevent calf scours

Tpc: Time of newborn in the calving pen

Do: Navel disinfection

Cna: Colostrum administration: traditional (natural) vs artificial

Vc: Volume of colostrum administered

Cb: Colostrum bank

Gua: Calf rearing system, grouped or individual

Ld: Type of liquid diet, raw milk or milk replacer

CN: Caretakers number

OT: Occupation time

CG: Caretaker gender

RVA: rotavirus

Cp: Cryptosporidium sp.

Age: Calf age

FULL MODEL

```
glm0 <- glm(case ~ HS + tpc + bc + Ld + OT + RVA + Cp + AGE, family=binomial)
> logistic.display(glm0)
```

Logistic regression predicting case : Diarrhea vs Healthy

	crude OR(95%CI)	adj. OR(95%CI)	P(Wald's test)	P(LR-test)
HS: ref.=small			0.006	
Medium	0.91 (0.61,1.37)	0.76 (0.43,1.33)	0.334	
Large	2.25 (1.25,4.04)	2.31 (0.94,5.64)	0.067	
tpc: >6h vs <6h	0.62 (0.41,0.92)	0.47 (0.25,0.9)	0.022	0.02
bc: No vs yes	0.65 (0.45,0.95)	1.43 (0.79,2.6)	0.237	0.232
Ld: m. replacer vs r. milk	1.63 (1.11,2.4)	1.92 (1.18,3.12)	0.009	0.008
OT: part vs Full Time	0.65 (0.45,0.95)	1.1 (0.66,1.83)	0.725	0.725

RVA: Positive vs Negative 2.82 (1.52, 5.24) 2.73 (1.38, 5.41) 0.004 0.004

Cp: Positive vs Negative 4.44 (2.79, 7.06) 3.26 (1.94, 5.47) < 0.001 < 0.00
1

AGE: (20, 90] vs [0, 20] 0.4 (0.28, 0.59) 0.44 (0.28, 0.68) < 0.001 < 0.00
1

Log-likelihood = -277.0623

No. of observations = 488

AIC value = 574.1246

The model selection was conducted by Stepwise selection of independent variables, we started with a full model including all variables selected with the univariate screening ($p < 0.2$). The command `step` removed each independent variable and compared the degrees of freedom reduced, the new deviance and the new AIC. The results were increasingly sorted by AIC. R selected the best fit model with the lowest Akaike Information Criterion (AIC) score. The variables of interest were considered significant if $P < 0.05$, and $P < 0.10$ was considered a tendency.

> modelstep <- step(glm0, direction="both")

Start: AIC=574.12

caso ~ vo + tpc + bc + ls + to + rva + cp + ed

	Df	Deviance	AIC
- to	1	554.25	572.25
- bc	1	555.55	573.55
<none>		554.12	574.12
- tpc	1	559.52	577.52
- ls	1	561.09	579.09
- vo	2	564.27	580.27
- rva	1	562.55	580.55
- ed	1	567.88	585.88
- cp	1	574.77	592.77

Step: AIC=572.25

caso ~ vo + tpc + bc + ls + rva + cp + ed

	Df	Deviance	AIC
- bc	1	555.73	571.73
<none>		554.25	572.25
+ to	1	554.12	574.12
- tpc	1	559.85	575.85
- ls	1	561.39	577.39
- rva	1	562.60	578.60
- vo	2	564.62	578.62
- ed	1	567.88	583.88
- cp	1	574.85	590.85

Step: AIC=571.73

caso ~ vo + tpc + ls + rva + cp + ed

	Df	Deviance	AIC
<none>		555.73	571.73
+ bc	1	554.25	572.25
+ to	1	555.55	573.55
- tpc	1	559.86	573.86
- ls	1	562.22	576.22
- vo	2	564.85	576.85
- rva	1	563.83	577.83
- ed	1	569.80	583.80
- cp	1	574.96	588.96

```
> summary(modelstep)
```

Call:

```
glm (formula = case ~ HS + tpc + Ld + RVA + Cp + AGE, family = binomial)
```

Deviance Residuals:

	Min	1Q	Median	3Q	
Max					
-1.6880	-0.8082	-0.6176	0.9541	2.1	
252					

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.3764	0.4069	-0.925	0.354954
HSMedian	-0.3703	0.2736	-1.353	0.175995
HSLarge	0.5767	0.3627	1.590	0.111843
tpc>6hs	-0.5749	0.2843	-2.022	0.043160 *
Ldreplacer	0.5879	0.2336	2.517	0.011852 *
rvaPositive	0.9895	0.3501	2.826	0.004713 **
cpPositive	1.1114	0.2556	4.348	1.37e-05 ***
age(20,90]	-0.8264	0.2220	-3.723	0.000197 ***
Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1				

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 636.95 on 487 degrees of freedom

Residual deviance: 555.73 on 480 degrees of freedom

AIC: 571.73

Number of Fisher Scoring iterations: 4

```
> logistic.display(modelstep)
```

Logistic regression predicting case : Healthy vs Diarrhea

	crude OR(95%CI)	adj. OR(95%CI)	P(Wald's test)	P(LR-test)
HS: ref.=small			0.01	
Medium	1.1 (0.73,1.64)	1.45 (0.85,2.48)	0.176	
Large	0.44 (0.25,0.8)	0.56 (0.28,1.14)	0.112	
tpc: >6 h vs <6 h	1.62 (1.09,2.42)	1.78 (1.02,3.1)	0.043	0.042
ld: m.replacer vs r.milk	0.61 (0.42,0.9)	0.56 (0.35,0.88)	0.012	0.011
RVA: Negative vs Positive	2.82 (1.52,5.24)	2.69 (1.35,5.34)	0.005	0.004
Cp: Negative vs Positive	4.44 (2.79,7.06)	3.04 (1.84,5.01)	< 0.001	< 0.001
AGE: (20,90] vs [0,20]	2.47 (1.69,3.61)	2.29 (1.48,3.53)	< 0.001	< 0.001

Log-likelihood = -277.863

No. of observations = 488

AIC value = 571.7259

Univariate screening for the dependent variable rotavirus infection

cc(rva, HS)

Variable rva	HS: Herd size		
	small	median	large
Positive	14	27	5
Negative	175	211	56
Odds ratio	1	0.63	0.9
Lower 95% CI		0.29	0.29
Upper 95% CI		1.28	3.32
Chi-squared = 2.036 , 2 d.f., P value = 0.361			
Fisher's exact test (2-sided) P value = 0.381			

> cc(rva, VAC)

Variable rva	VAC: Dam vaccination		
	YES	NO	total
Positive	44	2	46
Negative	406	36	442
Total	450	38	488
OR = 1.95 95% CI = 0.45, 8.38			
Chi-squared = 0.84, 1 d.f., P value = 0.361			
Fisher's exact test (2-sided) P value = 0.562			

> cc(rva, Tpc)

Variable rva	Tpc: time of newborn in calving pen		
	<6h	>6h	total
Positive	9	37	46
Negative	137	305	442
Total	146	342	488
OR = 0.54 95% CI = 0.25, 1.15			
Chi-squared = 2.6, 1 d.f., P value = 0.107			
Fisher's exact test (2-sided) P value = 0.128			

> cc(rva, Do)

variable rva	Do: navel disinfection		
	YES	NO	total
Positive	34	12	46
Negative	348	94	442
Total	382	106	488
OR = 0.77 95% CI = 0.38, 1.54			
Chi-squared = 0.57, 1 d.f., P value = 0.451			
Fisher's exact test (2-sided) P value = 0.454			

```
> cc(rva, cna)
```

variable rva	Cna: colostrum administration		
	Traditional (Natural)	Artifitial	total
Positive	27	19	46
Negative	284	158	442
Total	311	177	488
OR = 0.79 95% CI = 0.43, 1.47			
Chi-squared = 0.56, 1 d.f., P value = 0.45			
Fisher's exact test (2-sided) P value = 0.52			

```
> cc(rva, vc)
```

Variable rva	Vc: volume of colostrum administered		
	unknow	<4L	>4L
Positive	14	25	7
Negative	177	183	82
Odds ratio	1	0.58	0.93
lower 95% CI		0.27	0.33
upper 95% CI		1.2	2.82
Chi-squared = 2.875 , 2 d.f.,	P value = 0.237		
Fisher's exact test (2-sided)	P value = 0.258		

> cc(rva, Cb)

Variable rva	Cb: colostrum bank		
	YES	NO	total
Positive	24	22	46
Negative	230	212	442
Total	254	234	488
OR = 1.01 95% CI = 0.55, 1.85			
Chi-squared = 0, 1 d.f.,	P value = 0.986		
Fisher's exact test (2-sided)	P value = 1		

```
> cc(rva, gua)
```

variable rva	gua: calf rearing system		
	Grouped	individual	total
Positive	27	19	46
Negative	181	261	442
Total	208	280	488
OR = 2.05 95% CI = 1.11, 3.8			
Chi-squared = 5.36, 1 d.f., P value = 0.021			
Fisher's exact test (2-sided) P value = 0.028			

```
> cc(rva, Ld)
```

variable rva	Ld: Type of liquid diet, raw milk or milk replacer		
	Raw milk	Milk replacer	total
Positive	18	28	46
Negative	180	262	442
Total	198	290	488
OR = 0.94 95% CI = 0.5, 1.74			
Chi-squared = 0.04, 1 d.f., P value = 0.834			
Fisher's exact test (2-sided) P value = 0.876			

```
> cc(rva, CN)
```

		CN: Number of Caretakers		
		One	Two	total
rva				
Positive		45	1	46
Negative		416	26	442
Total		461	27	488
OR = 2.81 95% CI = 0.37, 21.22				
Chi-squared = 1.1, 1 d.f., P value = 0.295				
Fisher's exact test (2-sided) P value = 0.498				

> cc(case, OT)

		OT: occupation time		
		Part-time	Full-time	total
rva				
Positive		26	20	46
Negative		184	258	442
Total		210	278	488
OR = 1.82 95% CI = 0.99, 3.36				
Chi-squared = 3.77, 1 d.f., P value = 0.052				
Fisher's exact test (2-sided) P value = 0.061				

> cc(case, CG)

variable rva	CG: caretaker gender		
	Male	Female	total
Positive	22	24	46
Negative	316	126	442
Total	338	150	488
OR = 0.37 95% CI = 0.2, 0.68			
Chi-squared = 10.96, 1 d.f.,	P value = 0.001		
Fisher's exact test (2-sided)	P value = 0.002		

> cc(case, Age)

variable rva	Age: Calf's age		
	[0,20]	(20,90]	total
Positive	31	15	46
Negative	195	247	442
Total	226	262	488
OR = 2.62 95% CI = 1.37, 4.99			
Chi-squared = 9.08, 1 d.f.,	P value = 0.003		
Fisher's exact test (2-sided)	P value = 0.003		

```
glm1 <- glm(rva ~ gua + ot + gen + ed, family=binomial)
> logistic.display(glm1)
```

Logistic regression predicting rva : Positive vs Negative

	crude OR(95%CI)	adj. OR(95%CI)	P(wald's test)	P(LR-test)
gua: Individual vs Group	0.49 (0.26,0.9)	0.47 (0.23,0.94)	0.033	0.032
ot: Part-time vs Full Time	0.55 (0.3,1.01)	1.12 (0.5,2.51)	0.784	0.784
Gen: Female vs Male	2.74 (1.48,5.06)	2.65 (1.23,5.7)	0.013	0.012
ed: (20,90] vs [0,20]	0.38 (0.2,0.73)	0.45 (0.23,0.88)	0.019	0.017

Log-likelihood = -141.469

No. of observations = 488

AIC value = 292.938

```
> modelstep <- step(glm1, direction="both")
```

Start: AIC=292.94

rva ~ gua + to + sex + to + ed

	Df	Deviance	AIC
- ot	1	283.01	291.01
<none>		282.94	292.94
- gua	1	287.56	295.56
- ed	1	288.66	296.66
- gen	1	289.32	297.32

Step: AIC=291.01

rva ~ gua + gen + ed

	Df	Deviance	AIC
<none>		283.01	291.01
+ ot	1	282.94	292.94
- gua	1	288.04	294.04
- ed	1	288.94	294.94
- gen	1	290.99	296.99

```
> summary(modelstep)
```

Call:

```
glm(formula = rva ~ gua + gen + ed, family = binomial)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max

-0.7901 -0.5238 -0.3729 -0.2525 2.6312

Coefficients

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.9172	0.2911	-6.587	4.5e-11 ***
guaIndividual	-0.7137	0.3213	-2.221	0.02633 *
genFemale	0.9129	0.3213	2.841	0.00449 **
ed(20,90]	-0.7988	0.3362	-2.376	0.01751 *

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 304.79 on 487 degrees of freedom

Residual deviance: 283.01 on 484 degrees of freedom

AIC: 291.01

Number of Fisher Scoring iterations: 5

> logistic.display(modelstep)

Logistic regression predicting rva : Positivo vs Negativo

	crude OR(95%CI)	adj. OR(95%CI)	P(Wald's test)	P(LR-test)
gua: Individual vs Group	0.49 (0.26,0.9)	0.49 (0.26,0.92)	0.026	0.025
Gen: Female vs Male	2.74 (1.48,5.06)	2.49 (1.33,4.68)	0.004	0.005

ed: [20,90] vs [0,20]	0.38 (0.2,0.73)	0.45 (0.23,0.87)	0.018	0.015
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Log-likelihood = -141.5066

No. of observations = 488

AIC value = 291.0133

Univariate screening for the dependent variable cryptosporidium sp. infection

cc(rva, HS)

Variable cp	HS: Herd size		
	small	median	large
Positive	37	40	23
Negative	152	198	38
OR	1	1.2	0.4
lower 95% CI		0.71	0.21
upper 95% CI		2.04	0.8
Chi-squared = 13.174 , 2 d.f., P value = 0.001			
Fisher's exact test (2-sided) P value = 0.003			

> cc(cp, vc)

Variable cp	vc: volume of colostrum administered		
	unknown	<4L	>4L
Positive	45	39	16
Negative	146	169	73
Odds ratio	1	1.33	1.4
lower 95% CI		0.8	0.72
upper 95% CI		2.23	2.85
Chi-squared = 1.836 , 2 d.f.,	P value = 0.399		
Fisher's exact test (2-sided)	P value = 0.41		

> cc(cp, Tpc)

Variable cp	Tpc: time of newborn in calving pen		
	<6h	>6h	total
Positive	34	66	100
Negative	112	276	388
Total	146	342	488
OR = 1.27 95% CI = 0.79, 2.03			
Chi-squared = 1, 1 d.f.,	P value = 0.317		
Fisher's exact test (2-sided)	P value = 0.329		

```
> cc(cp, Do)
```

Variable cp	Do: navel disinfection		
	YES	NO	total
Positive	79	21	100
Negative	303	85	388
Total	382	106	488

OR = 1.06 95% CI = 0.62, 1.81

Chi-squared = 0.04, 1 d.f., P value = 0.84

Fisher's exact test (2-sided) P value = 0.89

```
> cc(rva, Cna)
```

Variable cp	Cna: colostrum administration		
	Traditional (Natural)	Artifitial	total
Positive	70	30	100
Negative	241	147	388
Total	311	177	488

OR = 1.42 95% CI = 0.89, 2.29

Chi-squared = 2.14, 1 d.f., P value = 0.144

Fisher's exact test (2-sided) P value = 0.162

> cc(cp, cb)

variable cp	cb: colostrum bank		
	YES	NO	total
Positive	72	28	100
Negative	182	206	388
Total	254	234	488
OR = 2.91 95% CI = 1.8, 4.7			
Chi-squared = 20.06, 1 d.f.,	P value = 0		
Fisher's exact test (2-sided)	P value = 0		

> cc(cp, gua)

variable cp	gua: calf rearing system		
	Grouped	individual	total
Positive	55	45	100
Negative	153	235	388
Total	208	280	488
OR = 1.88 95% CI = 1.2, 2.92			
Chi-squared = 7.88, 1 d.f.,	P value = 0.005		
Fisher's exact test (2-sided)	P value = 0.006		

> cc(cp, Ld)

variable cp	Ld: Type of liquid diet, raw milk or milk replacer		
	Raw milk	Milk replacer	total
Positive	38	62	100
Negative	160	228	388
Total	198	290	488
OR = 0.87 95% CI = 0.56, 1.37			
Chi-squared = 0.35, 1 d.f.,	P value = 0.55		
Fisher's exact test (2-sided)	P value = 0.57		

> cc(rva, CN)

variable cp	CN: Number of Caretakers		
	One	Two	total
Positive	97	3	100
Negative	364	24	388
Total	461	27	488
OR = 2.13 95% CI = 0.63, 7.23			
Chi-squared = 1.54, 1 d.f.,	P value = 0.214		
Fisher's exact test (2-sided)	P value = 0.325		

> cc(cp, OT)

Variable cp	OT: occupation time		
	Part-time	Full-time	total
Positive	55	45	100
Negative	155	233	388
Total	210	278	488
OR = 1.84 95% CI = 1.18, 2.86			
Chi-squared = 7.35, 1 d.f.,	P value = 0.007		
Fisher's exact test (2-sided)	P value = 0.009		

```
> cc(cp, CG)
```

Variable cp	CG: caretaker gender		
	Male	Female	total
Positive	75	25	100
Negative	263	125	388
Total	338	150	488
OR = 1.43 95% CI = 0.86, 2.35			
Chi-squared = 1.94, 1 d.f.,	P value = 0.163		
Fisher's exact test (2-sided)	P value = 0.182		

```
> cc(cp, Age)
```

Variable cp	Age: Calf's age		
	[0,20]	(20,90]	total
Positive	74	26	100
Negative	152	236	388
Total	226	262	488

OR = 4.42 95% CI = 2.7, 7.22

Chi-squared = 38.78, 1 d.f., P value = 0.0001

Fisher's exact test (2-sided) P value = 0.0001

Logistic regression for the dependent variable Cryptosporidium sp. infection

```
> glm2 <- glm(cp ~ HZ + tpc + cb + ld + ot + ed, family=binomial)
```

```
> summary(glm2)
```

Call:

```
glm(formula = cp ~ HZ + tpc + cb + ld + ot + ed, family = binomial)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-2.4249	0.2293	0.4242	0.6786	1.4035

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.1741	0.6795	-0.256	0.798
HZMedian	0.7397	0.4009	1.845	0.065 .
HZLarge	-0.1204	0.5656	-0.213	0.831
tpc>6 h	-0.1713	0.3661	-0.468	0.640
cbNo	1.4341	0.3409	4.207	2.59e-05 ***
Ldreplacer	-0.2228	0.3183	-0.700	0.484
Otpart-time	0.2626	0.3461	0.759	0.448
ed(20,90]	1.7574	0.2753	6.384	1.73e-10 ***

signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 494.97 on 487 degrees of freedom

Residual deviance: 414.55 on 480 degrees of freedom

AIC: 430.55

Number of Fisher Scoring iterations: 5

> logistic.display(glm2)

Logistic regression predicting cp : Negative vs Positive

	crude OR(95%CI)	adj. OR(95%CI)	P(Wald's test)	P(LR-test)
HZ: ref.=small				0.02
Median	1.2 (0.73,1.98)	2.1 (0.96,4.6)	0.065	
Large	0.4 (0.21,0.76)	0.89 (0.29,2.69)	0.831	
tpc: >6 h vs <6 h	1.27 (0.79,2.03)	0.84 (0.41,1.73)	0.64	0.641
cb: No vs Si	2.91 (1.8,4.7)	4.2 (2.15,8.18)	< 0.001	< 0.001
ld: replacer vs milk	0.87 (0.56,1.37)	0.8 (0.43,1.49)	0.484	0.484
ot: Part-time vs Full-time	1.84 (1.18,2.86)	1.3 (0.66,2.56)	0.448	0.447
ed: (20,90] vs [0,20]	4.42 (2.7,7.22)	5.8 (3.38,9.94)	< 0.001	< 0.001

Log-likelihood = -207.2758

No. of observations = 488

AIC value = 430.5515

```
> modelstep <- step(glm2, direction="both")
```

Start: AIC=430.55

cp ~ HZ + tpc + cb + ld + ot + ed

	Df	Deviance	AIC
- tpc	1	414.77	428.77
- ld	1	415.04	429.04
- ot	1	415.13	429.13
<none>		414.55	430.55
- HZ	2	422.41	434.41
- cb	1	432.54	446.54
- ed	1	462.09	476.09

Step: AIC=428.77

cp ~ HZ + cb + ld + ot + ed

	Df	Deviance	AIC
- ld	1	415.10	427.10
- ot	1	415.52	427.52
<none>		414.77	428.77
+ tpc	1	414.55	430.55
- HZ	2	425.83	435.83
- cb	1	433.56	445.56
- ed	1	462.52	474.52

Step: AIC=427.1

cp ~ HZ + cb + ot + ed

	Df	Deviance	AIC
- ot	1	416.64	426.64
<none>		415.10	427.10
+ 1d	1	414.77	428.77
+ tpc	1	415.04	429.04
- HZ	2	425.98	433.98
- cb	1	437.57	447.57
- ed	1	463.01	473.01

Step: AIC=426.64

cp ~ HZ + cb + ed

	Df	Deviance	AIC
<none>		416.64	426.64
+ ot	1	415.10	427.10
+ 1d	1	415.52	427.52
+ tpc	1	416.54	428.54
- HZ	2	427.29	433.29
- cb	1	439.79	447.79
- ed	1	465.79	473.79

> summary(modelstep)

Call:

glm(formula = cp ~ HZ + cb + ed, family = binomial)

Deviance Residuals:

	Min	1Q	Median	3Q	Max
	-2.4415	0.2256	0.4560	0.7052	1.3891

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.2691	0.3067	-0.877	0.3803
HZMedian	0.7302	0.3068	2.380	0.0173 *
HZlarge	-0.2161	0.4052	-0.533	0.5938
cbNo	1.4473	0.3148	4.598	4.27e-06 ***
ed(20,90]	1.7500	0.2698	6.487	8.73e-11 ***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 494.97 on 487 degrees of freedom

Residual deviance: 416.64 on 483 degrees of freedom

AIC: 426.64

Number of Fisher Scoring iterations: 5

```
> logistic.display(modelstep)
```

Logistic regression predicting cp : Negative vs Positive

	crude OR(95%CI)	adj. OR(95%CI)	P(wald's test)	P(LR-test)
vo: ref.=Small				0.005
Median	1.2 (0.73,1.98)	2.08 (1.14,3.79)	0.017	
Large	0.4 (0.21,0.76)	0.81 (0.36,1.78)	0.594	
cb: No vs Yes	2.91 (1.8,4.7)	4.25 (2.29,7.88)	< 0.001	< 0.001
ed: (20,90] vs [0,20]	4.42 (2.7,7.22)	5.75 (3.39,9.76)	< 0.001	< 0.001

Log-likelihood = -208.3219

No. of observations = 488

AIC value = 426.6439