



EAAP 2014
Copenhagen, Denmark
25 - 29 August 2014

65th annual meeting of the European Federation of Animal Science



Physiological factors contributing to lamb mortality

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Birth: one of the most challenging episode in life

Foetal environment
protected



In a diverse
environment



Finding food



Stress of
birth



Maternal care

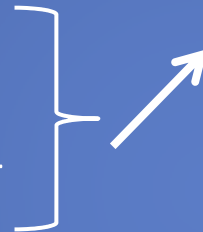


A mother-infant symbiosis and a neonatal race to find the udder



End of pregnancy :

- Glucose
- β -hydroxybutirate
- Insulin-like Growth Factor 1
- Progesterone
- Maternal immune system



A birth :

- Very little energy reserve
- No immunological protection
- Gut epithelium "open" for 24h

Methods



D'man sheep

Birth

3 days

Survival

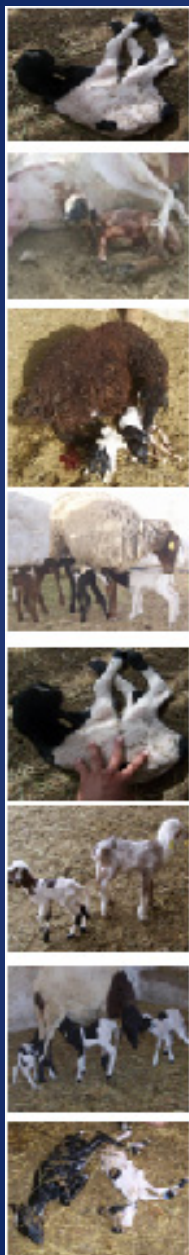
- Rectal temperature
- Glucose
- Total proteins or IgG
- Cholesterol and triglycerides
- Cortisol

3 categories of lambs : Light – Medium – Heavy

Sample size : 29 - 360

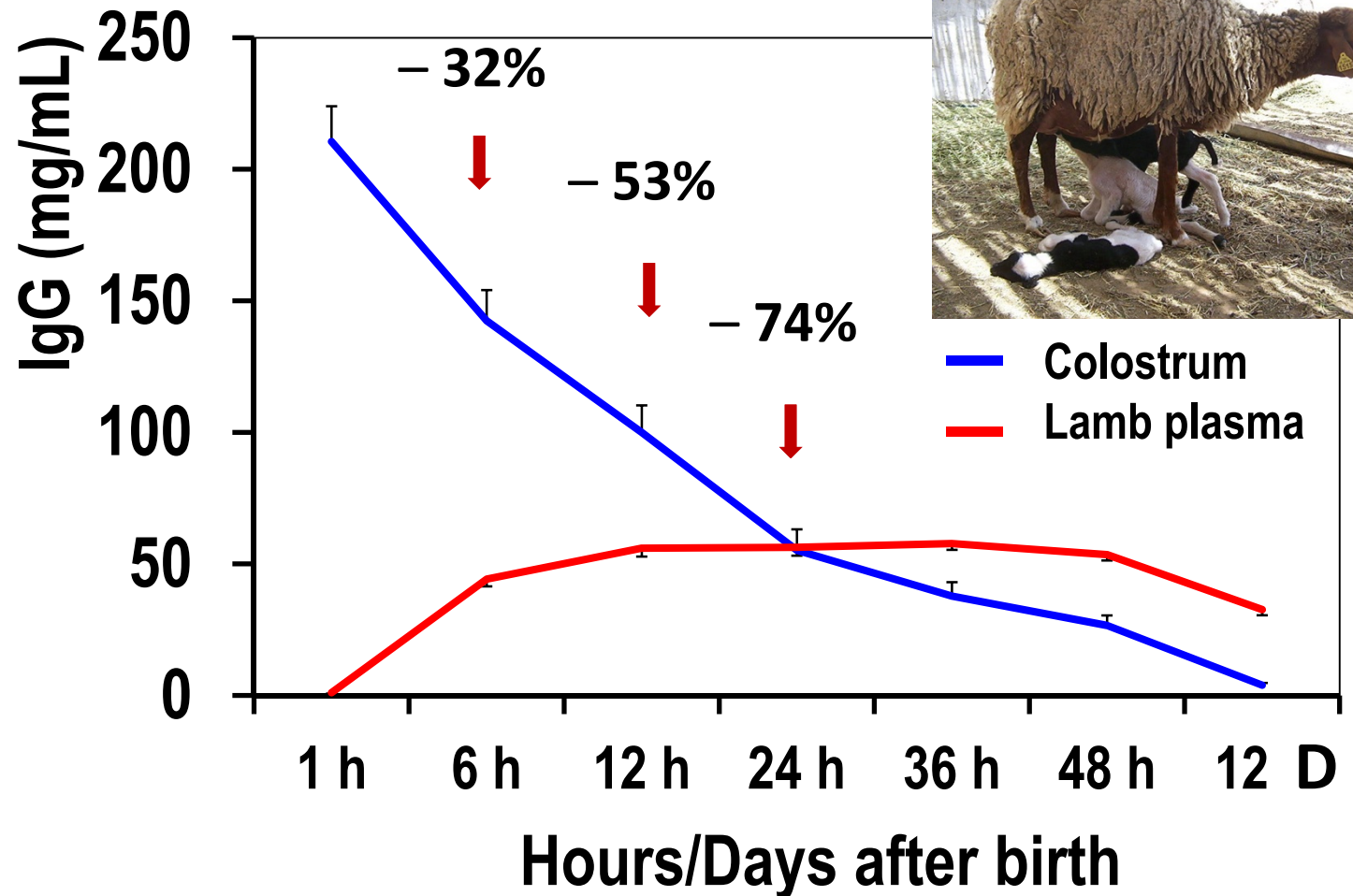
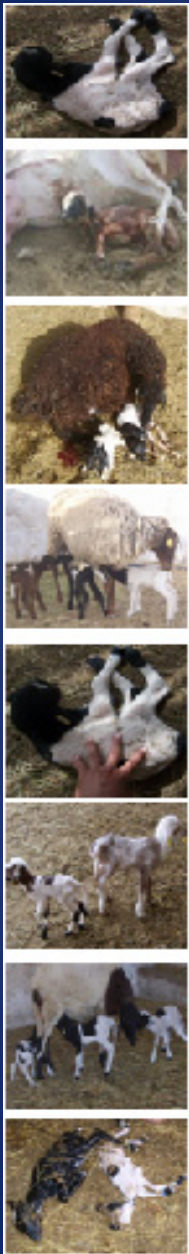
**Experimental farm in
Chenchou (Gabès)**

Neonatal rectal temperature, glucose & protein levels

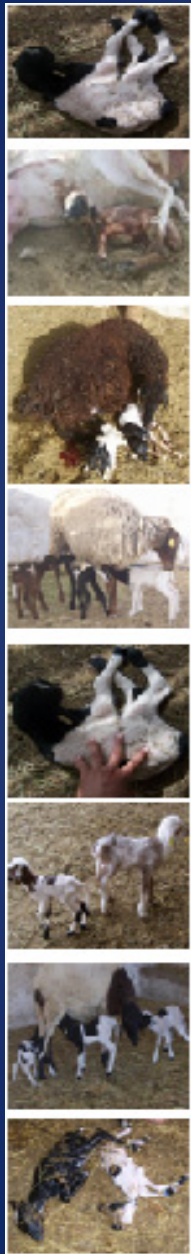


Age	Temperature (°C)	Glucose (mmol/L)	Proteins (g/L)
1-12 h	39,05 ± 0,04 ^b 33,60 - 40,30 (n = 312)	2,79 ± 0,15 ^b (n = 93)	62,30 ± 2,42 ^b (n = 79)
24-36 h	39,28 ± 0,03 ^a (n = 281)	3,87 ± 0,15 ^a (n = 91)	78,31 ± 1,68 ^a (n = 78)
48-60 h	39,27 ± 0,04 ^a (n = 210)	4,17 ± 0,15 ^a (n = 80)	77,56 ± 1,59 ^a (n = 76)

IgG transfer from mother to lamb

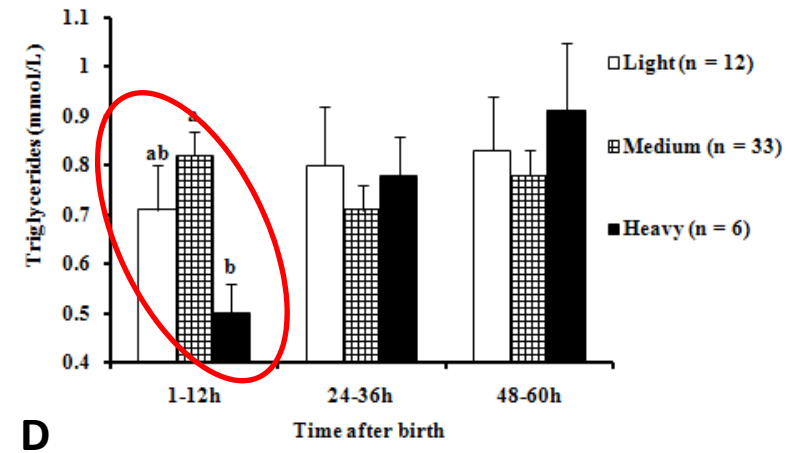
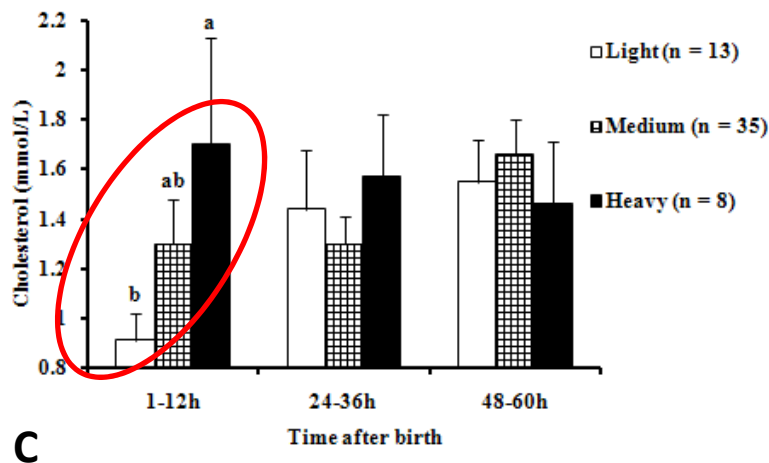
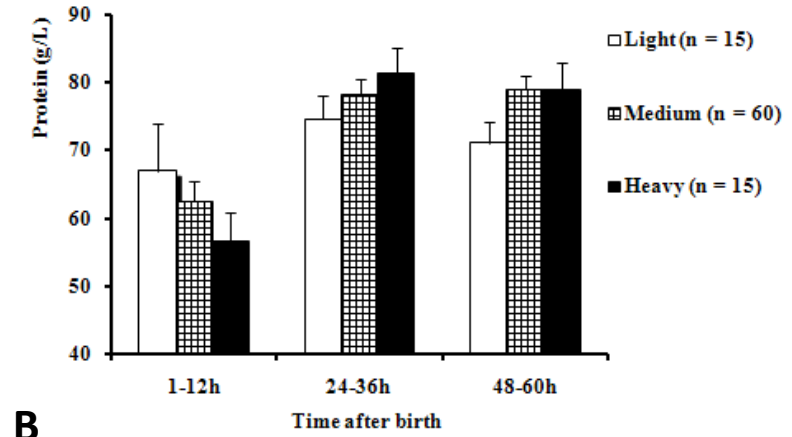
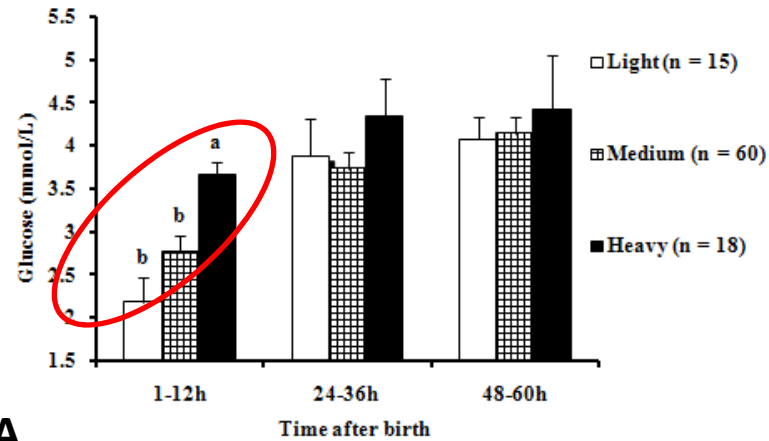
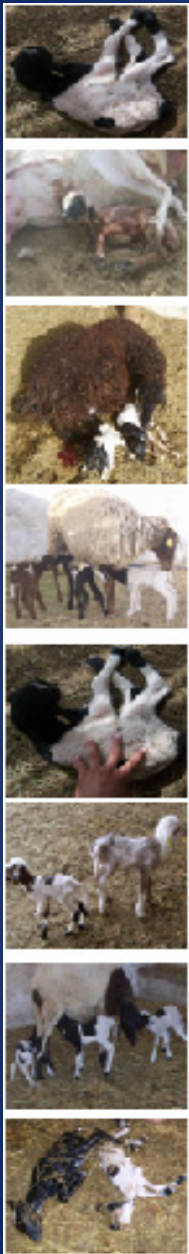


Neonatal cortisol, cholesterol & triglyceride levels

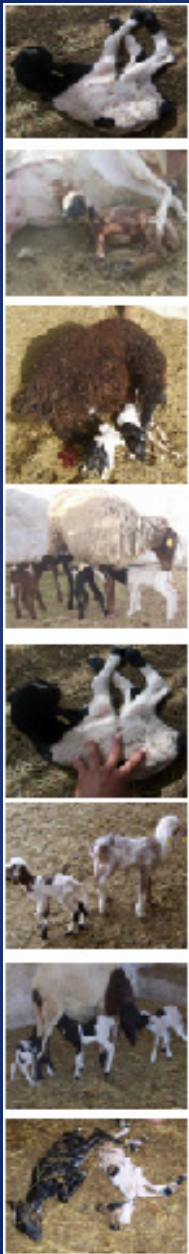


Age	Cortisol (ng/mL)	Cholesterol (mmol/L)	Triglycerides (mmol/L)
1-12 h	74,34 ± 10,55 (n = 20)	1,29 ± 0,13 ^b (n = 60)	0,70 ± 0,03 (n = 49)
24-36 h	70,65 ± 7,5 (n = 20)	1,36 ± 0,09 ^b (n = 58)	0,74 ± 0,04 (n = 54)
48-60 h	61,34 ± 9,32 (n = 19)	1,59 ± 0,10 ^a (n = 58)	0,81 ± 0,04 (n = 52)

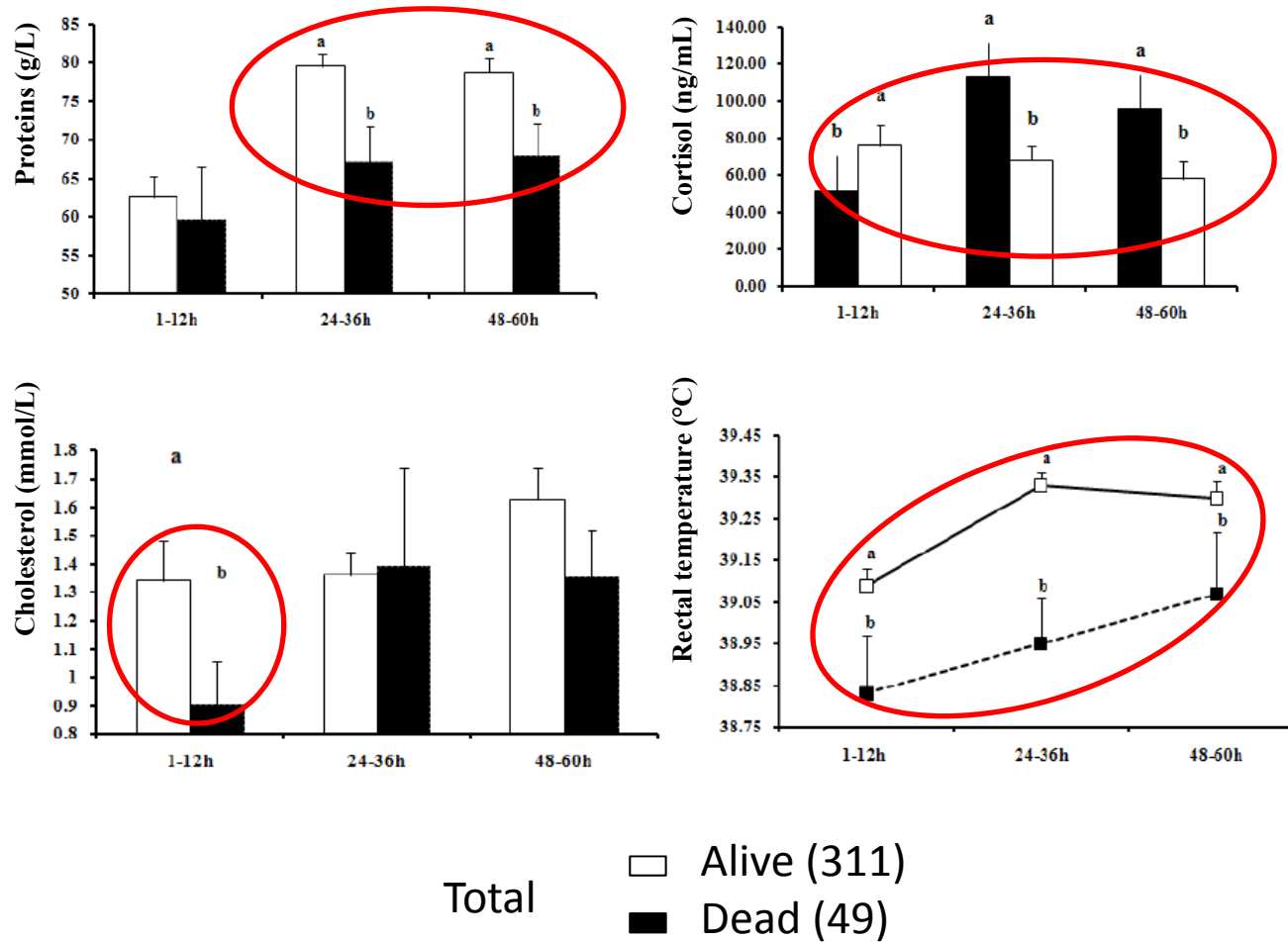
Neonatal glucose, protein, cholesterol & triglyceride levels : effect of birth size



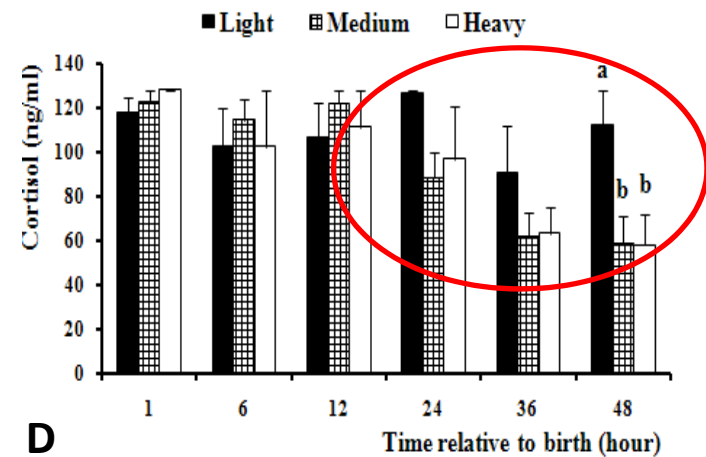
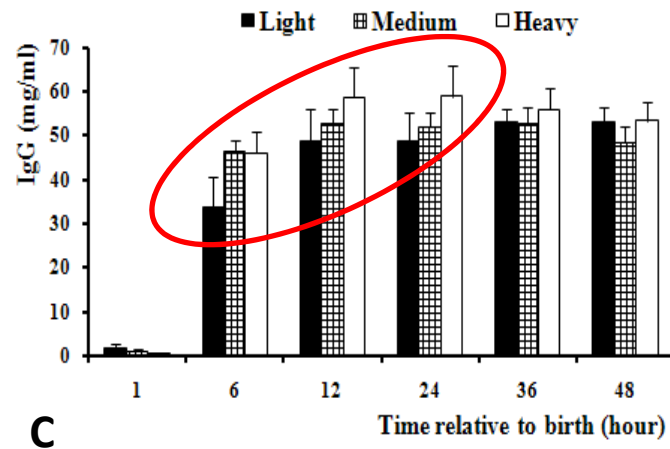
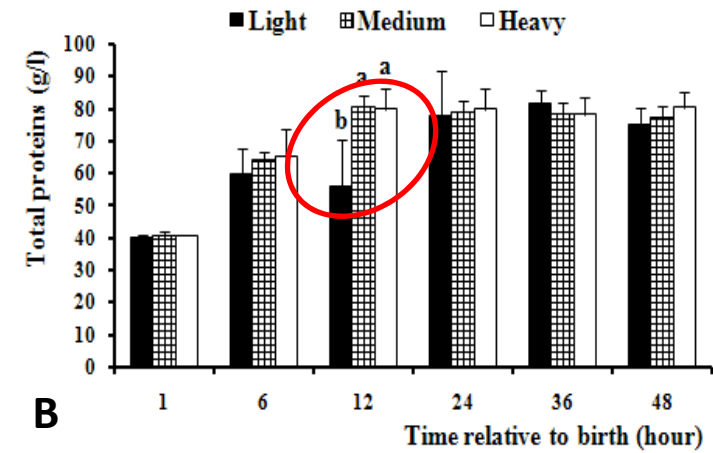
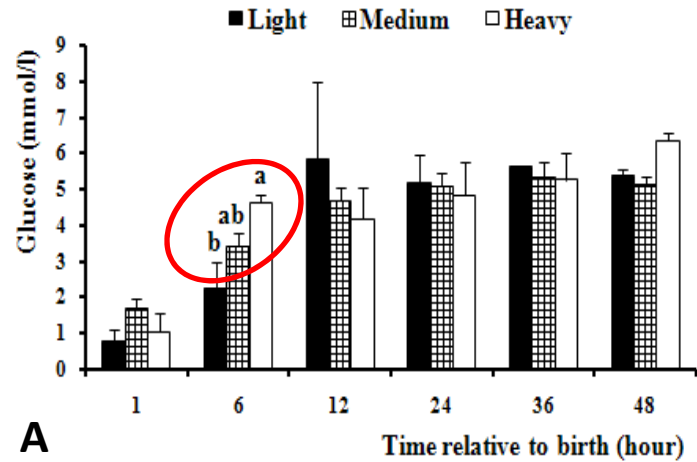
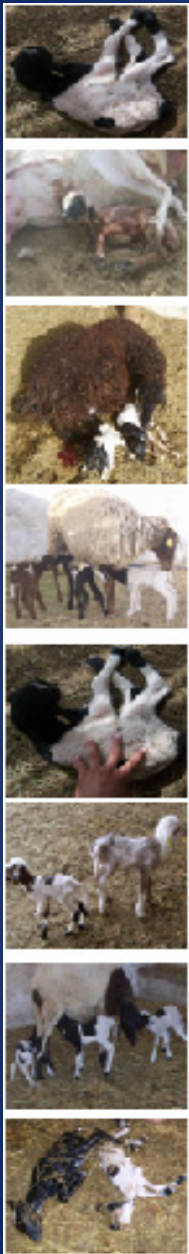
Neonatal physiology and survival up to 30 days



N = 19 - 60



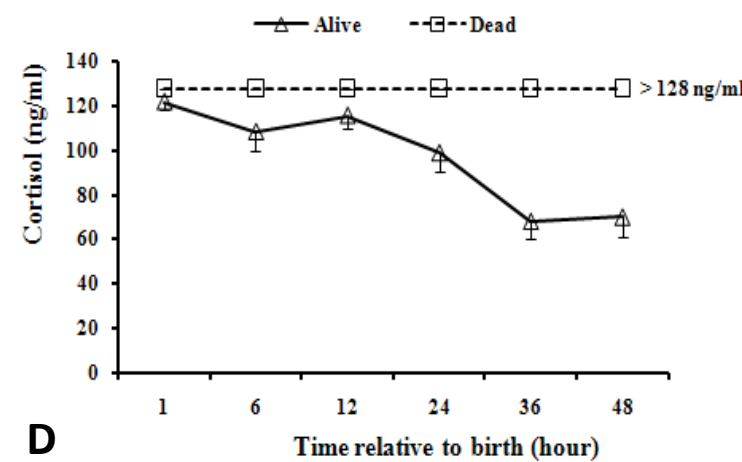
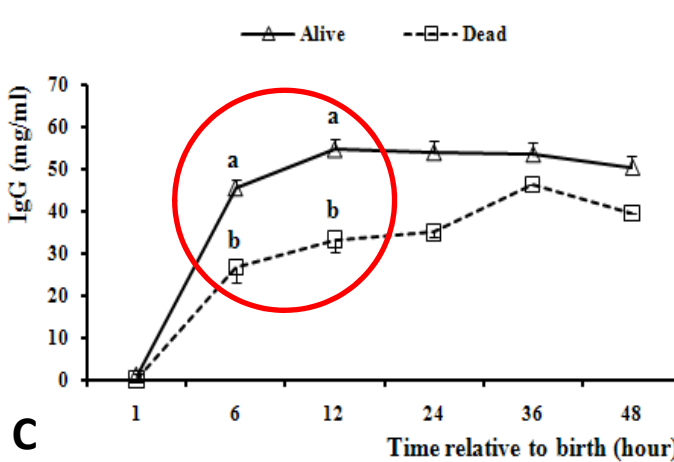
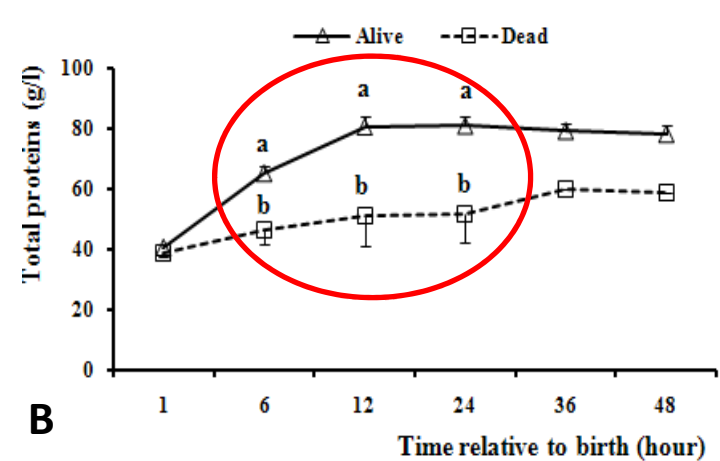
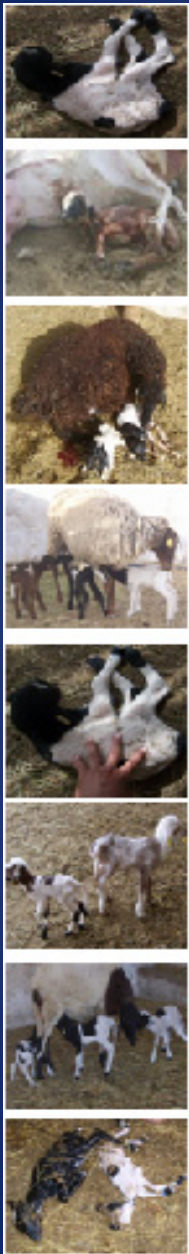
Neonatal glucose, protein, IgG & cortisol : effect of birth size



N = 29 lambs

Chniter et al., 2014 (in preparation)

Neonatal physiology and survival beyond 3 days



N = 29 lambs

Chniter et al., 2014 (in preparation)

Survival relies on :

1. Increase in glucose, cholesterol and protein levels (IgG)
 2. Decrease in cortisol levels which are high at birth
 3. Stable body temperature, above 39°C (drop immediately after birth)
- Light lambs are penalized compared to medium and heavy lambs
 - And consequently lambs born from large litters are penalized compared to lambs born from small litters

Main conclusions: the story is not that simple...

It does not mean that large litters should be avoided !!!

1. Not all ewes are equal in terms of colostrum production or quality. The amount of colostrum available at birth and its quality can be boosted in ewes bearing several lambs (Branchero et al., 2004, 2007; Hashemi et al., 2008).

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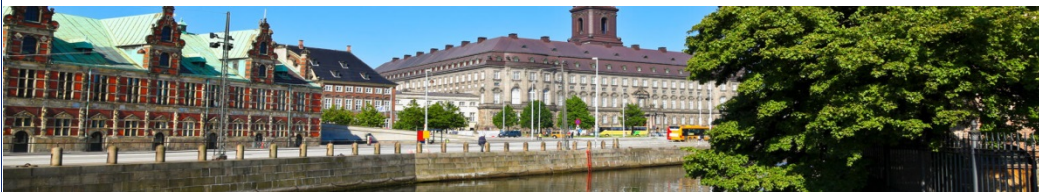
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2. Not all the lambs are equal at birth. A newborn lamb is what it has become during pregnancy: it should be prepared at the time of conception and all through gestation (Oldham et al., 2011; Thompson et al., 2011).

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3. In triplet-born lambs, mortality is not influenced by birth weight itself, but the birth weight of the litter mates. Reducing the variation in birth weight within a litter will increase the competitive ability for survival of each lamb (Morel et al., 2008).



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Thank you

