



**Extended Data Fig. 1. Schema of caesarean delivery of germ free (GF) marmosets.**

Germ-free marmoset neonates were delivered from their anaesthetised dam's uterus inside a flexible film isolator while the dam's abdomen was attached to the bottom film of the isolator, and then moved to a connected isolator to be resuscitated.

**Extended Data Table 1. Operations for acquiring germ-free marmosets.**

Operation	ID of dam	Pregnancy	Days post estimated ovulation	Age of dam (year)	BW of dam (g)	BPD of foetus (mm)	Day of US*	Operation	Time to delivery (min)†	Litter size	No. of resuscitated newborns
1	I4744F	ET	142	6	430	18.2	-11	HT	26	1	1
2	I4186F	ET	141	8	458	18.3	-11	CS	30	1	1
3	I5482F	ET	140	4	461	17.5	-9	CS	35	2	0
4	I4738F	ET	140	7	347	19.0	0	CS	18	1	1
5	I5621F	ET	141	4	393	19.5	0	CS	17	1	1
6	I5508F	ET	139	4	516	18.1	-8	CS	21	3	3
7	I5516F	ET	140	4	396	18.1	-9	CS	22	2	2
8	I4172F	ET	140	9	422	20.3	0	CS	16	1	1
9	I3478F	ET	138	11	425	18.2	-7	CS	17	1	1
10	I4186F	ET	140	9	478	17.7	-9	CS	14	1	1
11	N531F	NM	NE	5	450	17.4	-7	CS	16	2	2
12	I5011F	ET	140	7	390	18.4	-9	CS	17	1	1
13	I4014F	NM	NE	10	447	17.4	-1	CS	19	2	2
14	YI042F	NM	NE	9	436	18.2	0	CS	17	2	2
15	I5914F	ET	140	4	471	19.2	0	CS	15	1	1
16	CM96F	NM	NE	11	430	19.4	-1	CS	13	1	1
17	I5463F	NM	NE	6	502	20.1	-4	CS	16	1	1
18	I637F	ET	140	8	483	18.7	-2	CS	18	1	1
Mean±SD			140±1	7±3	440±45	18.6±0.9	-4±4	-	19±6	1.4±0.6	1.3±0.7

ET: embryo transfer, NM: natural mating, NE: not estimated, BW: Bodyweight, BPD: foetal biparietal diameter,

US: ultrasound examination, HT: hysterectomy, CS: caesarean section.

\* Day of US examinations for BPD measurement. Days counted from the date of operation. † Time required from the induction of anaesthesia to delivery.

**Extended Data Table 2. Hand-rearing of marmoset neonates in sterile isolators.**

Operation No.	Litter size	Neonates No.	Animal ID	Sex	BW at birth (g)	Feeding contents*	Survival days	Culture test	Clinical findings
1	1	1	881M	M	34.8	E+H	weaning	Negative	-
2	1	2	749F	F	35.3	E+H	10	Negative	Severe diarrhoea, weight loss (>15%)
4	1	3	755F	F	30.5	E	4	Negative	Weight loss (>15%)
5	1	4	759F	F	34.7	E+H	4	Negative	Severe diarrhoea, weight loss (>15%)
		5	902M	M	29.2	H	4		Weight loss (>15%)
6	3	6	760F	F	29.6	H	6	Negative	Severe diarrhoea, weight loss (>15%)
		7	901M	M	29.7	H	7		Severe diarrhoea
7	2	8	903M	M	28.0	E	7	Negative	Severe diarrhoea, weight loss (>15%)
		9	904M	M	24.7	E	6		Severe diarrhoea
8	1	10	905M	M	33.8	G, E+G	weaning	<i>Paenibacillus taichungensis</i>	-
9	1	11	911M	M	33.4	-	1	Negative	No phonation
10	1	12	916M	M	34.7	E+G	6	Negative	Anaemia (pale mucosa), severe diarrhoea
11	2	13	924M	M	31.8	E	6	Negative	Severe diarrhoea, weight loss (>15%)
		14	925M	M	30.1	E	2		-
12	1	15	926M	M	36.1	E+H	weaning	<i>Bacillus licheniformis</i>	-
13	2	16	931M	M	30.1	E+H	6	Negative	Severe diarrhoea
		17	932M	M	29.1	E+H	12		Severe diarrhoea
14	2	18	789F	F	26.7	E+G	5	<i>Staphylococcus warneri</i>	Immature (eyelid closure, short fur), severe diarrhoea, weight loss (>15%)
		19	933M	M	28.0	E+G	6		Immature (eyelid closure, short fur)
15	1	20	792F	F	32.0	G, E+G	weaning	Negative	Weight loss (>15%)
16	1	21	939M	M	34.3	G, E+G	weaning	Negative	-
17	1	22	795F	F	38.4	G, E+G	weaning	Negative	-
18	1	23	947M	M	34.2	G, E+G	weaning	Negative	-

Operation No. is identical to Extended Data Table 1. BW: body weight. \* E: elemental liquid diet (Elental P, EA Pharma); H: human infant formula (Hohoemi, Meiji); G: powdered goat milk (Meyenberg). Detailed feeding protocols are listed in Supplementary Table 3.