THE FUTURE OF TRANSPORT

CLIENT PROJECT REPORT CPR4141

British Eventing Falls Database: 2023 season

S.Bozorg

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1 Introduction

The British Eventing (BE) falls project started at the beginning of the 2001 Eventing season. It aims to collect data that can be used to develop a greater knowledge of how falls occur in cross-country events. This knowledge should assist in the improvement of cross-country courses and fences, and reduce the risk of falls and injuries to both riders and horses.

Federation Equestre International (FEI) has a similar project which records data relating to falls that occur at FEI events. This project was started at the beginning of the 2002 Eventing season.

A number of reports have been published presenting analyses of the information collected as part of these two projects. These reports indicate that there is an increased probability of serious or fatal human injury in particular circumstances where a horse and its rider fall whilst participating in the sport. Specifically, this arises where the horse is caused to somersault by the way in which it impacts a cross-country fence, and by its dynamic interaction with the structure of that fence. In 2002, a countermeasure was developed that alters the pivot point of rotational impacts and so reduces the likelihood of a somersault occurring. This is achieved by allowing the uppermost rail of the fence to drop on impact, and this solution is known as a 'frangible element'.

The frangible fence element is designed to be no more rigid than a normal fence element, and so it should not present any more risk to the horse or rider than the standard fence. However, if the impact forces are high and/or the impact configuration is such that the frangible element does break, the fence should be considerably safer.

1.1 Aims of report

The aims of this report are to identify and present:

- The severity of different types of falls;
- The cross-country courses where a relatively large proportion of starters fall;
- Fences exhibiting a particularly high percentage of fallers relative to the number of competitors;
- The severity of falls at frangible elements.

This report describes all reported falls that have occurred during British Eventing (BE) and Federation Equestre Internationale (FEI) UK horse trials during the 2023 season.

The report also presents information relating to falls that occurred at frangible fences and aims to assess the effectiveness of frangible fences in reducing the seriousness of falls in terms of rider injury.

2 Data set

This report summarises information that has been collected and made available to TRL from both BE and FEI events that occurred in the UK during the 2023 Eventing season. This year's report covers the 2023 season between March 2023 and October 2023.

BE and FEI UK events differ in rules and regulations, but these variations should not influence the risk of a fall or injury. The data used for this report are not affected by these differences and therefore the report combines the data from both BE and FEI UK events.

The information concerning each fall has been collected on a "Fall Report Form", completed electronically or on a paper form at the location of the fall by the fence judge. This Report Form includes reference to the specific fence and route upon which the fall occurred. The database allows the details of the fall to be linked to corresponding data concerning the course, the fence, and the specific fence element at which the falls occurred.

TRL received information about 100 BE and 20 FEI events during the 2023 season.

In 2023, the BE events were run over 386 courses with a total of 39,729 cross-country competitors competing, i.e. an average of 98 competitors per course. The FEI UK events were run over 43 courses with a total of 3,355 cross-country competitors competing, i.e. an average of 78 competitors per course.

Details of all the falls from the 386 BE courses and the 43 FEI UK courses are presented in Appendix B (provided in a separate document). The data has been ordered alphabetically.

There was a total of 1,480 incidents recorded in 2023 (1,078 incidents on the cross-country course, and 402 in the show jumping, warm-up and practice stages). Only falls that occurred on the cross-country course have been included in the analysis in this report.

The severity of each fall is recorded in the BE database. The severity of the rider's injury is based on the fence judges' initial assessment; this assessment may be revised in the light of further medical information. The assessment is based on the following guidelines:

- Fatal - Death within 30 days as a result of injuries sustained in the accident; not death from natural causes.
- Serious - Admitted to hospital as an in-patient either immediately or later as a result of the injuries sustained in the accident, or died, more than 30 days after the accident from injuries sustained; or one or more of the following injuries: fracture, internal injury, severe cuts or lacerations, crushing, concussion.
- Slight - One or more of the following injuries: sprains, bruises, cuts judged not to be severe.
- No Injury - No recorded injuries.

It should be noted that percentages in this report are presented to zero decimal places and may not sum to 100% due to rounding.

3 Description of courses and fences

This section gives an overview of the courses and fences in 2023 and considers how this has changed from the 2002-03 [1]season. Table 1 shows the 429 cross country courses in 2023, by the course status and governing body (BE or FEI).

Table 1: Number of courses by governing body and course status

BE or FEI event	Course status	2023
BE	One day event (ODE)	381
	Three day event (3DE)	5
FEI	CCI	43
Total		**429**

The majority of courses were one day events (381, 89%).

Table 2 shows the number of courses, the average number of competitors that started each course, and the average number of fences by course class.

Table 2: Courses in the 2023 season

Course class	Number of courses 2023	Average number of competitors 2023	Average number of fences 2023
BE80	62	60	22
BE90	85	235	50
BE100	93	198	51
BE105	11	144	57
Novice	71	132	58
Intermediate	35	116	64
Advanced	9	41	35
CCI** Short	15	135	57
CCI** Long	8	130	62
CCI*** Short	13	172	63
CCI*** Long	4	69	37
CCI**** Short	11	151	70
CCI**** Long	4	42	42
CCI***** Long	2	58	67
1*	5	114	52
GO BE70	1	4	18
Total	**429**	**98**	**26**

[1]In previous years, this annual report has used data from two seasons covering the period from July to June the following year; for example, the first report produced by TRL covered the period 1st July 2002 to 30th June 2003. Since 2016, the reporting periods have changed to match the BE seasons which typically run from March to October each year.

Overall, a total of 429 courses were offered in the year 2023. The BE90 course class had the highest average number of competitors with235, which is notably higher than the other classes. The BE90 class also had a notable number of courses, totalling 85, and an average of 50 fences. The BE100 class had the second highest number of competitors with an average of198. On the lower end, the GO BE70 class had the least average number of competitors at 4, with only 1 course and the fewest fences at 18. The average number of competitors per course across all classes was98, and the average number of fences was 26.

Figure 1 shows the number of courses for each course class from 2002-03 to 2023.

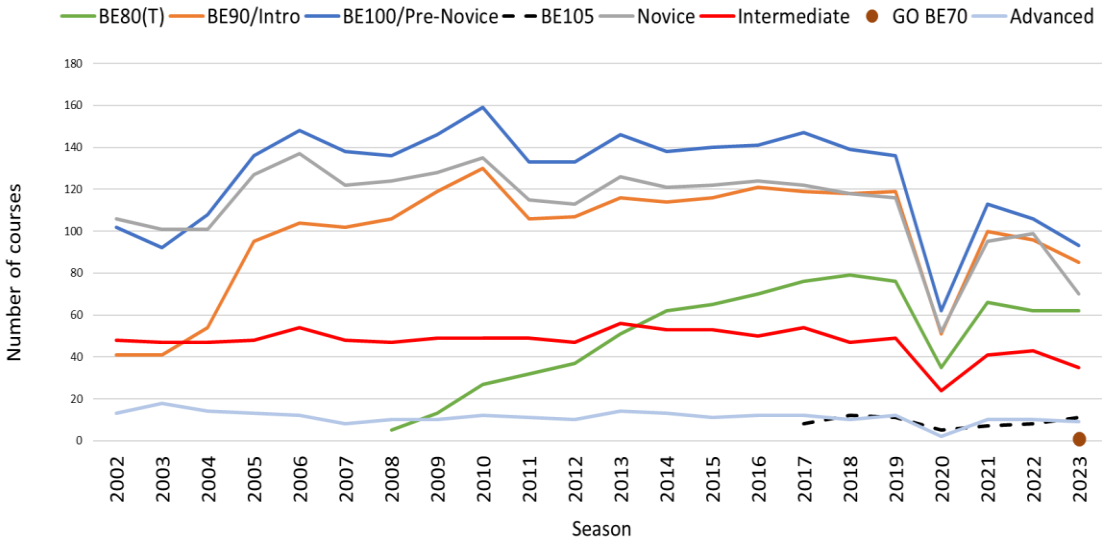


Figure 1: Number of courses per course class by season, 2002-03 to 2023

In 2023, the equestrian eventing course offerings reflect a mixed pattern of stability and decline across various class levels. While the BE80(T) class maintains a steady number of courses compared to the prior year, most other classes such as BE90/Intro, BE100/Pre-Novice, Novice, Intermediate, and advanced show a downward trend in their course counts. Conversely, the BE105 class experiences a minor increase in offerings. The GO BE70 class is a new addition to the course classes in 2023.

Figure 2 shows the total (summed over all events) and average number of starters per cross country course for each season from 2002-03 to 2023.

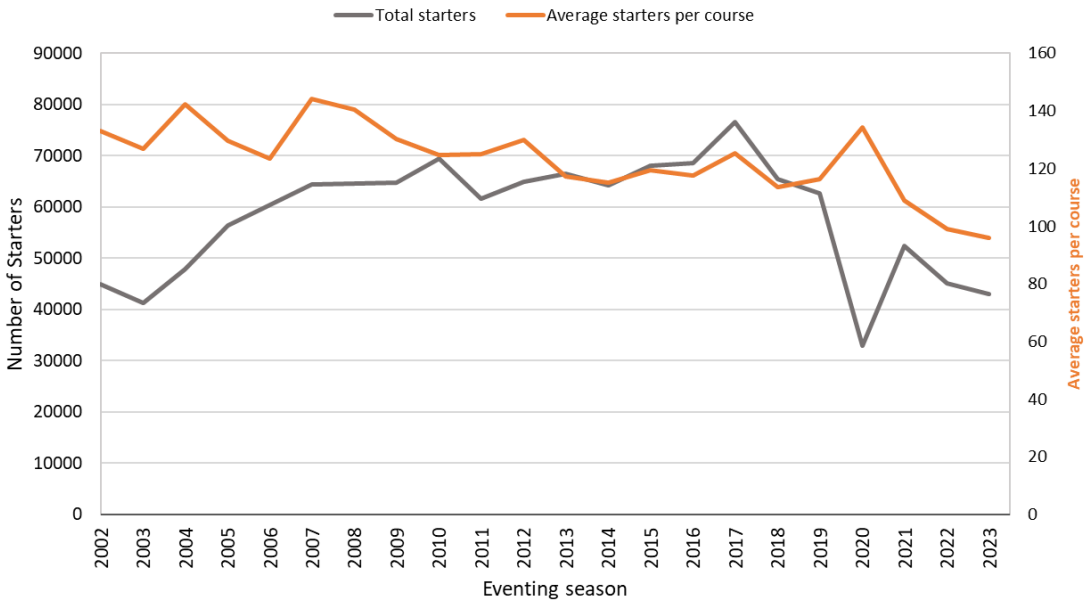


Figure 2: Total and average number of starters per course by season

There is a steady increase in the total number of starters from 2002, reaching a peak around 2010. Following a slight dip, there was a resurgence to another peak in 2017. However, from 2017 onwards, there is a marked decline, with a steep drop occurring in 2020 and again after 2021, reaching the second lowest point in 2023 within the observed period.

The average number of starters follows a general downwards trend over time. The average starters per course peaked around 2007 before gradually declining and peaking again in 2020. After 2020, there's a marked decrease, with the average starters per course in 2023 dropping to the lowest level in the observed period.

Table 3 summarises the distribution of the different types of fences used in eventing courses in 2023.

Table 3: Number and proportion of fences by fence type

Type of fence	Number of fences	Percentage
Post and rails (A)	679	6%
Palisade (B)	782	7%
Square spread (C)	2107	18%
Ascending Spread (D)	1903	16%
Brush (E)	1388	12%
Round (F)	2983	26%
Corner (G)	463	4%
Trakehner (H)	265	2%
Step (J)	431	4%
Water (K)	369	3%
Ditch (L)	263	2%

Type of fence	Number of fences	Percentage
Total	**11,633**	**100%**

The data from the 2023 cross-country season reveal that 'Round' fences were the most prevalent type used, constituting over a quarter (26%) of all fences. Conversely, 'Ditch' and 'Trakehner' fences were among the least utilised, each making up just a fraction over 2% of the course designs. 'Square Spread' fences were also a significant feature, accounting for 18% of the obstacles, while 'Ascending Spread' fences were close behind at 16%. 'Posts & Rails', as well as 'Palisade' types, were comparatively less common, representing 6% and 7% respectively.

Figure 3 shows how the proportion of fences has changed over time.

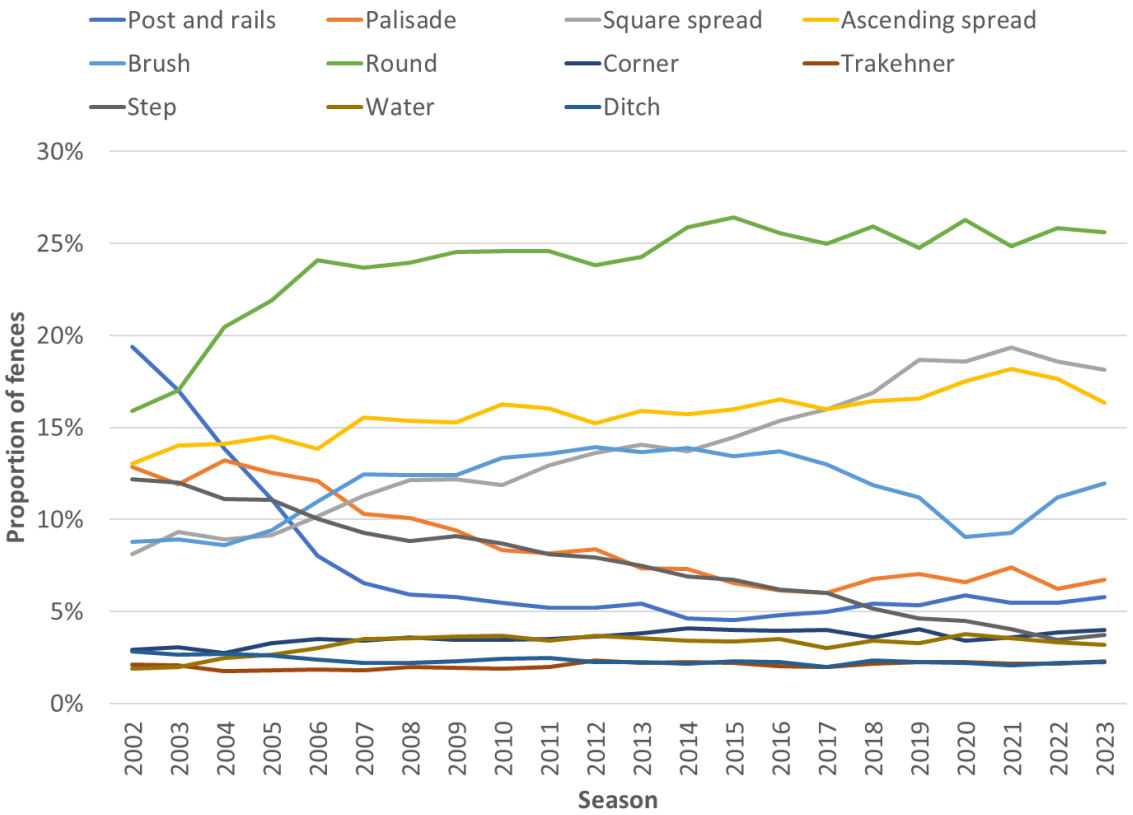


Figure 3: Proportion of each fence type by season, 2002-03 to 2023

'Round' fences consistently make up the largest proportion of fences each year, with a slight increasing trend over time. The use of 'Square spread' fences has increased over time and these have been the second most popular since 2017. The 'Ascending spread' type has maintained a steady presence over the years and has been in the top three most used fence types each year since 2002.

The use of 'Post and rails' fences decreased considerably between 2002 and 2007 and has remained at a fairly constant level of around 5% since then. The use of Palisade fences has also decreased steadily over time and now sits at around 7%. On the lower end, 'Trakehner' and 'Ditch' fences have consistently maintained the smallest proportions since 2006, indicating their continued limited use.

4 Description of severity of falls

There were a total of 1,078 falls recorded on cross country courses in the database in 2023. Of these falls, 98 were recorded as not occurring at a fence and none were categorised as unknown injury severity. The injury distribution of the total falls is shown in Table 4.

Table 4: Riders who fell by severity of their injury

Rider's injury severity	Number of riders	Percentage
Fatal injury	0	0%
Serious injury	37	3%
Slight injury	83	8%
No injury	959	89%
Not Known	0	0%
Total	**1,078**	**100**

There were no fatalities during the 2023 season; 3% of riders who fell were seriously injured, 8% were slightly injured, and 89% were recorded as having no injuries from the fall.

4.1 Falls not at a fence

Of the 98 falls not at a fence, 24 involved both the horse and rider falling, 74 involved just the rider falling and none were recorded as "No Fall" (i.e., the rider dismounted the horse rather than fell).

Of the 24 falls involving both the horse and rider falling:

- One rider was recorded as sustaining a serious injury. Six riders were recorded as having slight injuries, and 17 riders were not injured.

Of the 74 falls where only the rider fell:

- Two riders were seriously injured; two were slightly injured, and 70 were recorded as having no injuries.

4.2 Classification of falls which occurred at a fence

There were a total of 980 falls recorded as involving a fence in the 2023 season.

Of the 980 falls involving a fence in 2023:

- 841 involved the rider being unseated and the horse remaining upright – referred to below as "unseated rider" falls.

- 139 involved the horse and the rider both falling.
    - The horse somersaulted in 20 of these falls.
- Zero falls were recorded as “No Fall”
- 108 occurred at frangible elements.
    - 93 falls involved the rider being unseated.
    - 15 falls involved the horse and rider both falling at a frangible element.
    - Zero falls were recorded as “No fall”.

4.2.1 Unseated rider falls

A breakdown of the unseated rider falls at a fence by severity of injury to the rider is displayed in Table 5.

Table 5: Severity of unseated rider falls

Rider's Injury Severity	Number of riders	Percentage
Fatal injury	0	0%
Serious injury	13	2%
Slight injury	56	7%
No injury	772	92%
Total	**841**	**100%**

Of the 13 riders with a serious injury, two of them had contact with the fence. The descriptions of these was as follows:

- Horse refused, rider didn't and continued over horses’ shoulder and landed in the ditch.
- Horse slowed, went to take off. Front legs over fence, rider went over fence, horse pulled back onto take off side of fence.

Of those with a slight injury, 51 of them did not hit the fence and the horse did not fall or tread on the rider. There were two instances where the fall was not on the fence but rather the horse fell on or tread on the rider. Three falls involved contact with the fence and were described as follows:

- The horse did a large jump over but then came to a stop at B, resulting in the rider becoming unseated upon contact with the fence.
- Horse refused, rider fell onto fence in 2 falls.

4.2.2 Horse and rider both falling

Table 6 details the 139 falls where the horse and rider both fell in the 2023 season. This is roughly 14% of all the falls at fences in 2023. These falls have been categorised by the severity of the riders’ injuries.

Table 6: Severity of horse and rider somersault and non-somersault falls in 2023

Rider's Injury Severity	Falls without somersaulting		Falls involving the horse somersaulting		All horse and rider falls	
	No. riders	Percentage	No. riders	Percentage	No. riders	Percentage
Fatal injury	0	0%	0	0%	0	0%
Serious injury	11	9%	10	50%	21	15%
Slight injury	14	12%	5	25%	19	14%
No injury	94	79%	5	25%	99	71%
Not known	0	0%	0	0%	0	0%
Total	**119**	**100%**	**20**	**100%**	**139**	**100%**

For falls without the horse somersaulting, there were 119 incidents in total. No fatal injuries were recorded, 11 incidents resulted in serious injury (9%), 14 in slight injuries (12%), and the majority, 94 incidents, resulted in no injury (79%).

For falls involving the horse somersaulting, there were 20 incidents. Again, no fatal injuries were reported, 10 incidents led to serious injuries (50%), 5 to slight injuries (25%), and 5 resulted in no injury (25%).

When considering all falls (both with and without horse somersaulting), there were 139 incidents in total. No fatal injuries were reported, serious injuries occurred in 21 incidents (15%), slight injuries in 19 incidents (14%), and the majority, 99 incidents, resulted in no injury (71%).

4.2.3 All fall types

Figure 4 shows the trend in the percentage of fatally or seriously injured riders based on all reporting periods to date.

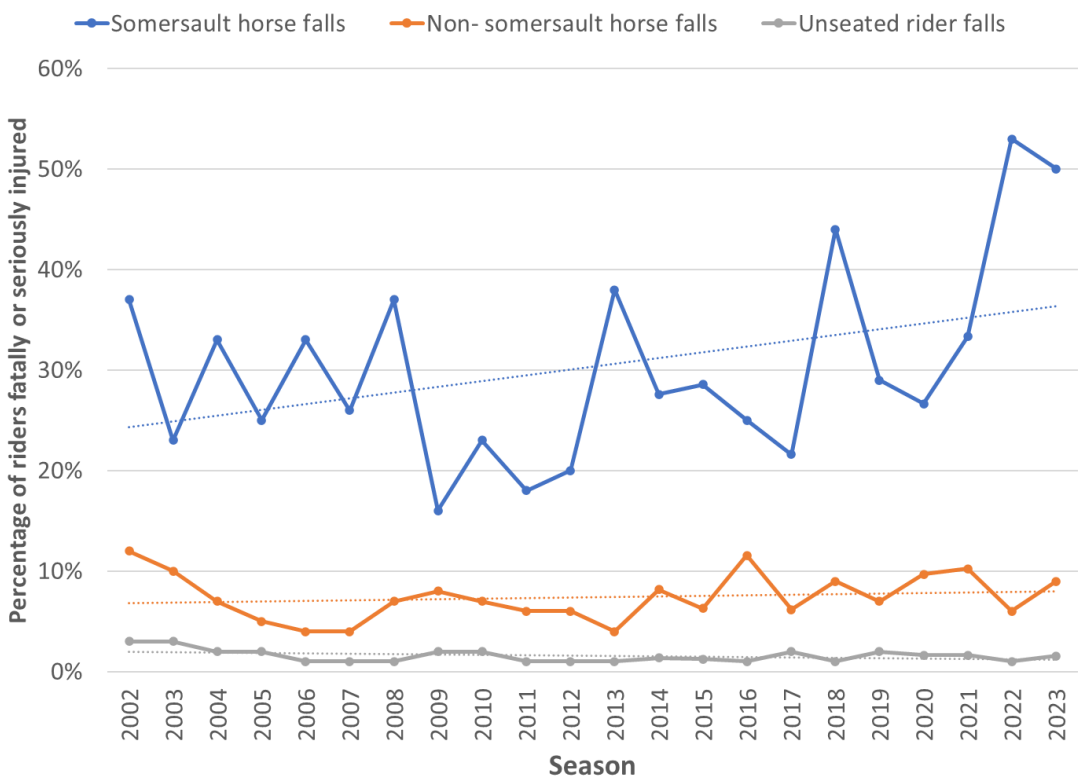


Figure 4: Proportion of riders killed or seriously injured by season, 2002-03 to 2023

Somersault Horse Falls: This line shows more variability and higher rates of fatal or serious injuries compared to the other two categories. The trend fluctuates significantly over the years, with some seasons witnessing substantial increases or decreases compared with the previous year. The figures range from as low as 16% in 2009 to as high as 53% in 2022, with a 50% fatal or serious injury rate in 2023.

Non-Somersault Horse Falls: The incidence of fatal or serious injuries in this category is consistently lower than somersault falls, remaining mostly under 10%. The trend is relatively stable with minor fluctuations. The percentages show a slight upward trend since 2006, rising to 9% by 2023.

Unseated Rider Falls: This category has the lowest percentage of fatal or serious injuries, with the line staying close to the bottom of the graph throughout the period. The trend is fairly flat, suggesting a consistent risk profile over the years. The injury rates are quite stable, typically ranging from 1% to 3%, and do not show a clear trend of increase or decrease over time.

Based on the combined results from all 22 seasons (2002-03 to 2023):

• The combined percentage of riders who were seriously/fatally injured in a somersault fall was 30%.

• The combined risk of a rider being seriously/fatally injured in a non-somersault fall was 7%.

• The combined risk of a rider being seriously/fatally injured in an unseated rider fall was 2%

4.3. Location of falls at fences

4.3.1. Courses with the highest percentage of falls

The total number of starters in each cross-country section, the number of falls, and the percentage of starters that fell can be found for all the 2023 courses in Appendix B (provided in a separate document). It should be noted that the number of falls on each course includes falls which did not occur at a fence.

There was an average of 2.5 falls per course in 2023. Table 7 displays the courses on which the percentage of starters that fell was 10% or higher. Note 'UR' is unseated rider and 'HF' is horse and rider fall. The total falls are calculated by adding the number of horse falls to rider falls.

Table 7: Percentage of falls per number of starters for courses where over 10% of starters have had falls

Event Name	Event date	Course Class	Course Type	Number of falls			Number of starters	Percentage of falls per starter
				HF	UR	Total		
BRAMHAM INTERNATIONAL	08/06/2023	**** long	CCI	2	1	3	11	27
BADMINTON INTERNATIONAL	05/05/2023	***** long	CCI	5	10	15	58	26
CHILDERIC SADDLES LITTLE DOWNHAM INTERNATIONAL (3)	26/09/2023	Advanced	1-Day	1	3	4	23	17
CHATSWORTH INTERNATIONAL	12/05/2023	Advanced	1-Day	0	2	2	12	17
ASTON-LE-WALLS (3)	10/08/2023	Novice	1-Day	0	9	9	60	15
DEFENDER BLAIR CASTLE INTERNATIONAL	24/08/2023	** short	CCI	0	3	3	21	14
BLENHEIM PALACE INTERNATIONAL HORSE TRIALS	14/09/2023	**** long	CCI	1	11	12	88	14
BRAMHAM INTERNATIONAL	08/06/2023	**** long	CCI	2	4	6	46	13
BELSAY INTERNATIONAL	31/05/2023	** short	1-Day	1	7	8	65	12
DEFENDER BURGHLEY HORSE TRIALS	31/08/2023	***** long	CCI	1	6	7	58	12
HOPETOUN (2) & REGIONAL CHAMPIONSHIP	12/08/2023	Intermediate	1-Day	0	3	3	27	11
DEFENDER BLAIR CASTLE INTERNATIONAL	24/08/2023	1*	CCI	0	6	6	56	11
ALLERTON PARK	16/09/2023	Advanced	1-Day	0	2	2	19	11

Event Name	Event date	Course Class	Course Type	Number of falls			Number of starters	Percentage of falls per starter
				HF	UR	Total		
CHATSWORTH INTERNATIONAL	12/05/2023	**** short	CCI	3	4	7	72	10
DAUNTSEY PARK	28/07/2023	Intermediate	1-Day	0	5	5	52	10
BICTON ARENA INTERNATIONAL (1)	25/05/2023	*** long	CCI	3	5	8	84	10

The highest percentage of falls per starter was 27% for one of the Bramham International events on 08/06/2023, closely followed by 26% for the Badminton International event on 05/05/2023.

Figure 5 shows the number of falls per thousand jumps by course class.

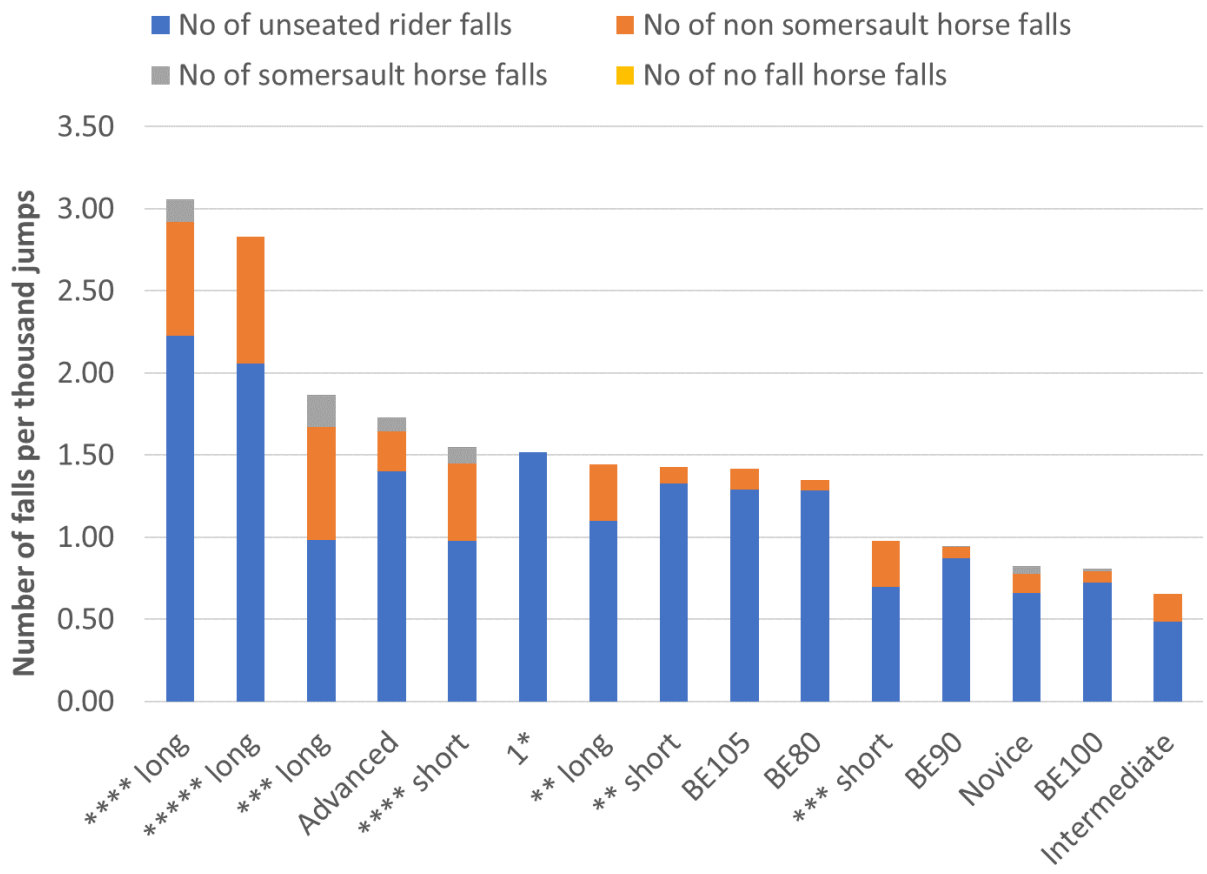


Figure 5: Number of falls per thousand jumps for different course classes in 2023

In 2023, **** long courses had the highest number of total falls (3.06) and unseated rider falls (2.22) per thousand jumps. The ***** long courses had the second highest number of total falls (2.8) and unseated rider falls (2.1) per thousand jumps. The BE100 courses (0.81) and Intermediate courses (0.65) had the lowest number of falls per thousand jumps.

Overall, the trend indicates that the higher the competition level (as indicated by more stars in the CCI categories), the greater the frequency of both unseated rider and non-somersault horse falls.

4.3.2. Fence elements with the highest percentage of falls

There were a total of 11,633 fences employed on the 386 courses in 2023. Of the reported falls, 980 occurred at a fence.

Table 8 displays the elements within fences where over 5% of starters fell. The description of the fence type codes can be found in 4.2.3Appendix A of this report.

Table 8: Elements of the fence where 5% or more of riders fell

Event Name	Event date	Course Class	Fence number and element	Type of fence	Number of falls			Number of starters	% of falls per starter
					HF	UR	Total		
BRAMHAM INTERNATIONAL	08/06/2023	**** long	6 C	D	0	1	1	11	9
BRAMHAM INTERNATIONAL	08/06/2023	**** long	18 E	F	1	0	1	11	9
CHATSWORTH INTERNATIONAL	12/05/2023	Advanced	15 B	E	0	1	1	12	8
CHATSWORTH INTERNATIONAL	12/05/2023	Advanced	13 B	C	0	1	1	12	8
BAREFOOT RETREATS BURNHAM MARKET INTERNATIONAL (1)	14/04/2023	Advanced	7 A	A	0	2	2	30	7
BAREFOOT RETREATS BURNHAM MARKET INTERNATIONAL (1)	14/04/2023	Advanced	11	D	0	2	2	30	7
ALLERTON PARK	16/09/2023	Advanced	13 C	E	0	1	1	19	5
ALLERTON PARK	16/09/2023	Advanced	16 B	F	0	1	1	19	5
DEFENDER BLAIR CASTLE INTERNATIONAL	24/08/2023	** short	12	C	0	1	1	21	5
DEFENDER BLAIR CASTLE INTERNATIONAL	24/08/2023	** short	17	H	0	1	1	21	5
DEFENDER BLAIR CASTLE INTERNATIONAL	24/08/2023	** short	7	E	0	1	1	21	5

Event Name	Event date	Course Class	Fence number and element	Type of fence	Number of falls			Number of starters	% of falls per starter
					HF	UR	Total		
HOPETOUN (1)	10/06/2023	Intermediate	16 A	D	0	1	1	22	5

The fence elements with the most significant number of falls per starter were at the Bramham International **** long event. Here, on fence numbers 6C (D-Ascending Spread type) and 18 E (F-Round type), 9% of starters experienced falls. For both fence elements, there was one fall out of 11 starters. The Chatsworth International event labelled as Advanced on the 12th of May 2023 had fence elements 15 B and 13 B, both with an 8% fall rate per starter. The type of these fences are C (Square) and E (Brush) respectively, with each recording one unseated rider and no horse falls among 12 starters. Due to the very small numbers of falls occurring, these data should be interpreted with caution.

4.3.3. Element types with highest percentage of falls

This section of the report discusses the probability of a fall at different element types.

British Eventing does not record the number of times each fence element is jumped. As a result of this, it is not possible to calculate the probability of a rider falling at any element. However, if certain broad assumptions are made, then it is possible to estimate the number of times that particular types of element are jumped and compare this with the number of falls that occur at that element type. In this way, it is possible to obtain some understanding, although not complete, of those element types at which falls are most likely to occur.

The broad assumptions made are:

- All cross-country starters jump all the fences.
- All cross-country starters jump all the elements of every fence, even if there is more than one route through the fence.
- All the cross-country starters finish the course.

It is recognised that these assumptions are not always valid. However, it is considered that they are sufficiently valid for the analysis to provide a useful insight.

Figure 6 shows information of the 980 falls at fences broken down by type of fall. It shows an estimate of the number of falls per thousand attempts at each element type.

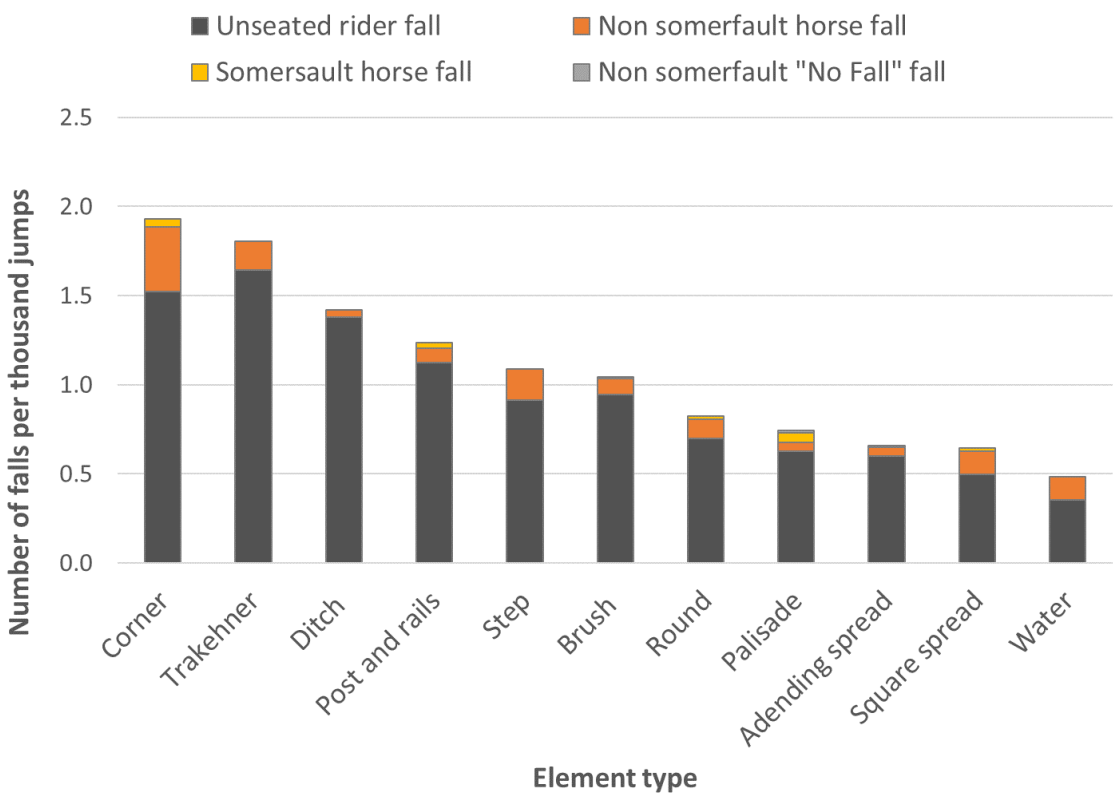


Figure 6: Number of falls per thousand jumps for different fence elements in 2023

In 2023, 'Corner' fence elements had the highest number of falls per thousand jumps of all elements (1.9). This was followed by 'Trakehner' fences (1.8) and 'Ditch' fences (1.4).

Table 9 compares the number of falls per thousand jumps in 2023 to the number of falls in the 2002-03 season by fence type. There was 1 fall where the element type is not known.

Table 9: Number of falls per thousand jumps per fence type for 2002-03 compared to 2023

Fence type	Number of falls		Number of falls per thousand jumps	
	2002-03	2023	2002-03	2023
Post and rails	286	77	1.16	1.24
Palisade	209	55	1.35	0.73
Square spread	113	127	1.17	0.64
Ascending spread	146	119	0.91	0.66
Brush	106	136	0.99	1.04
Round	266	232	1.32	0.83
Corner	56	86	1.64	1.93
Trakehner	45	45	1.65	1.81
Step	182	43	1.18	1.09
Water	36	19	1.37	0.48
Ditch	56	36	1.6	1.42

The number of falls in 2023 has decreased for most fence types when compared to the numbers from 2002-03, with notable decreases for ‘Post and rails’, ‘Palisade’ and ‘Step’ types. 'Brush', 'Corner', and 'Square spread' have seen an increase, while 'Trakehner' has remained the same.

When looking at the number of falls per thousand jumps, 'Post and rails', 'Brush', 'Corner', and 'Trakehner' show small increases in fall rate, indicating a higher frequency of falls per thousand jumps in 2023 as opposed to 2002-03. All other fence types show a decrease in fall rate per thousand jumps.

Overall, more fence types show a decrease in the absolute number of falls and fall rates per thousand jumps, with a few exceptions where there is an increase.

4.4. Falls at frangible fences

During the start of a potential somersault fall the top rail of a frangible element is designed to break, changing the pivot point around which the horse is rotating, and thus reducing the risk of the horse somersaulting.

Table 10 shows the breakdown of falls at frangible fences by fall and element type. Overall, there were 109 falls in 2023 reported to have occurred at frangible elements; the table shows 94 instances where the rider was unseated, 12 non-somersault falls where the horse fell, and a total of 3 falls involving somersaults.

Table 10: Falls where the horse contacted a frangible element, broken down by fall type and element type

Element Type	Rider Unseated	Non-Somersault Horse Fall	Non-Somersault No Horse Fall	Somersault Horse Fall	Total
Post and rails	55	1	0	2	58
Palisade	2	0	0	0	2
Square Spread	18	5	0	0	23
Ascending Spread	5	0	0	1	6
Brush	3	0	0	0	3
Round	9	6	0	0	15
Corner	2	0	0	0	2
Total	**94**	**12**	**0**	**3**	**109**

4.4.1. Broken frangible elements

Table 11 shows the course and fall information for the 18 falls at frangible fence elements where the fence broke. One rider was recorded as having a serious injury and four riders were recorded as having a slight injury and the rest sustained no injury.

Table 11: Summary of broken frangible element falls

Event name	Date	Course class	Fence number & element	Type of fence	Fall type	Horse fell/trod on rider	Rider's severity injury
BRECKENBROUGH	09/04/2023	BE100	12	C - Square Spread	Rider unseated	No	No injury
BAREFOOT RETREATS BURNHAM MARKET INTERNATIONAL (1)	16/04/2023	*** short	21 B	G - Corner	Rider unseated	No	Slight (Sprains, slight cuts and bruises)
CIRENCESTER PARK (2)	30/04/2023	Advanced	17	G - Corner	Horse and rider both fell	No	Slight (Sprains, slight cuts and bruises)
CIRENCESTER PARK (2)	01/05/2023	Novice	11	C - Square Spread	Rider unseated	No	No injury
TWESELDOWN (2)	10/07/2023	Novice	17	D - Ascending Spread	Rider unseated	No	No injury
BISHOP BURTON INTERNATIONAL (2)	29/07/2023	BE105	9	C - Square Spread	Rider unseated	No	Slight (Sprains, slight cuts and bruises)
DAUNTSEY PARK	29/07/2023	BE100	11 A	A - Posts & Rails	Rider unseated	No	No injury
DAUNTSEY PARK	29/07/2023	BE90	9	A - Posts & Rails	Rider unseated	No	No injury
DAUNTSEY PARK	29/07/2023	Novice	12	A - Posts & Rails	Rider unseated	No	No injury
HOPETOUN (2) & REGIONAL CHAMPIONSHIP	12/08/2023	Intermediate	19 B	A - Posts & Rails	Rider unseated	No	No injury
DEFENDER BLAIR CASTLE INTERNATIONAL	26/08/2023	** long	11	B - Palisade	Rider unseated	No	Slight (Sprains, slight cuts and bruises)
DEFENDER BLAIR CASTLE INTERNATIONAL	26/08/2023	*** long	18 B	G - Corner	Horse and rider both fell	No	Serious (Hospital treatment required)
DEFENDER BLAIR CASTLE INTERNATIONAL	26/08/2023	**** long	4 A	C - Square Spread	Horse and rider both fell	No	No injury

DEFENDER BURGHLEY HORSE TRIALS	02/09/2023	***** long	12	C - Square Spread	Rider unseated	No	No injury
DEFENDER BURGHLEY HORSE TRIALS	02/09/2023	***** long	14 C Direct	G - Corner	Rider unseated	No	No injury
DEFENDER BURGHLEY HORSE TRIALS	02/09/2023	***** long	20 A Direct	C - Square Spread	Horse and rider both fell	No	No injury
CHILDERIC SADDLES LITTLE DOWNHAM INTERNATIONAL (3)	26/09/2023	Advanced	13	G - Corner	Rider unseated	No	No injury
CHILDERIC SADDLES LITTLE DOWNHAM INTERNATIONAL (3)	26/09/2023	Advanced	13	G - Corner	Horse and rider both fell	No	No injury

4.4.2. Non-somersault horse falls at unbroken frangible elements

There were 7 horse falls reported to have occurred at frangible elements where the element did not break. Although frangible elements are only designed to break during the start of a potential somersault, they may offer further protection to riders and horses in horse falls. Table 12 outlines the information which TRL have received in relation to the 7 horse falls at frangible elements in which the frangible elements did not deploy.

Of the 7 non-somersault horse and rider falls at frangible elements that did not break, one rider was seriously injured, none were slightly injured, and the remainder had no injuries.

Table 12: Summary of non-somersault horse falls at unbroken frangible elements

Event name	Date	Course class	Fence number & element	Type of fence	Fall Type	Horse fell/trod on rider	Rider's Injury severity
EVENTING SPRING CARNIVAL AT THORESBY PARK INTERNATIONAL	02/04/2023	**** short	10 B	G - Corner	Horse and rider both fell	0	No injury
BICTON ARENA INTERNATIONAL (1)	27/05/2023	*** long	10 C	G - Corner	Horse and rider both fell	0	No injury
ALNWICK FORD INTERNATIONAL (1)	23/06/2023	Intermediate	10 A	A - Posts & Rails	Horse and rider both fell	0	No injury
ALNWICK FORD INTERNATIONAL (1)	23/06/2023	Intermediate	4 A	C - Square Spread	Horse and rider both fell	0	Serious (Hospital treatment required)

Event name	Date	Course class	Fence number & element	Type of fence	Fall Type	Horse fell/trod on rider	Rider's Injury severity
ASPEN COOLING LTD SOLIHULL (2)	20/08/2023	Novice	12	C - Square Spread	Horse and rider both fell	0	No injury
AGRIA LIFETIME EQUINE SHELFORD MANOR (2)	26/08/2023	Novice	19	C - Square Spread	Horse and rider both fell	0	No injury
DEFENDER BLAIR CASTLE INTERNATIONAL	26/08/2023	*** long	18 B	G - Corner	Horse and rider both fell	0	No injury

4.5. Air jackets

Since the beginning of the 2013 season, for each rider who falls, the Fall Report Form records whether the rider was wearing an air jacket, and if it activated during the fall. When a rider is unseated or thrown from a horse the air jacket is designed to inflate, providing some protection to the spinal column and neck. The choice of whether or not to wear an air jacket is the rider's, although it should be noted that if an air jacket is worn this should be in addition to a BETA level 3 body protector.

In the 1,078 falls on the cross-country course in 2023, 48% of riders who fell were recorded as wearing an air jacket. It should be noted that this does not indicate that 48% of all riders were wearing an air jacket, but that at least 48% of those who fell were wearing one. Riders who are more likely to fall may be more likely to choose to wear an air jacket for the benefit they can provide in the more serious falls.

Table 13 shows the proportion of riders who fell wearing an air jacket by course class.

Table 13: Air jacket status by course class

Course class	Air jacket worn	Total number of falls	% people who fell who were wearing an air jacket
** long	17	25	68%
** short	33	43	77%
*** long	13	19	68%
*** short	24	35	69%
**** long	18	22	82%
**** short	31	46	67%
***** long	16	22	73%
1*	8	11	73%
Advanced	12	21	57%
BE100	93	221	42%
BE105	14	22	64%
BE80	20	108	19%

Course class	Air jacket worn	Total number of falls	% people who fell who were wearing an air jacket
BE90	76	221	34%
Go BE70	0	0	0%
Intermediate	45	78	58%
Novice	95	184	52%
Total	**515**	**1078**	**48%**

The highest percentage of riders who fell while wearing an air jacket was in the **** long class (82%), suggesting a high adoption rate of safety gear in this category. The lowest percentage of riders wearing air jackets during a fall (excluding the Go BE70 class where no falls occurred) was observed in the BE80 class (19%), which could imply a lower perceived risk or a different approach to safety equipment in this class. In the more advanced classes (marked with more stars), the percentage of riders wearing air jackets during falls is generally higher, indicating a possible trend where more experienced riders or those in more challenging events are more likely to wear air jackets. The Go BE70 class has zero falls recorded, and consequently, no air jacket usage is noted. Across all classes, just less than half (48%) of the people who fell were wearing an air jacket.

Table 14 shows the breakdown of whether the rider was wearing an air jacket by the rider's injury severity.

Table 14: Air Jacket status by rider injury severity in fall

Rider's injury severity	Air jacket worn and activated		Air jacket worn but don't know if activated		Air jacket worn (but not activated)		Air jacket not worn	
	Number	%	Number	%	Number	%	Number	%
Fatal	0	0%	0	0%	0	0%	0	0%
Serious injury	19	4%	1	6%	2	10%	12	3%
Slight injury	42	9%	1	6%	1	5%	35	8%
No Injury	416	87%	16	89%	17	85%	419	90%
Total	**477**	**100%**	**18**	**100%**	**20**	**100%**	**466**	**100%**

No fatal injuries were reported across all categories. The majority of riders who wore and activated their air jacket did not sustain any injury (87%).

For riders who wore their air jacket but did not activate it or did not know if it was activated, the percentages of serious injuries was 10% and 6%, respectively.

The highest proportion of no injuries is observed in the group where air jackets were not worn (90%), which could suggest a correlation with the nature of falls where a rider might opt not to wear an air jacket.

5. Comparison between seasons

5.1. Introduction

British Eventing (BE) has adopted a casualty reduction strategy, which aims to:

- Reduce the percentage of riders who are fatally/seriously injured.
- Reduce the percentage of horse falls relative to the number of competitors.

To meet the above aims BE have adopted some targets. These targets have been prioritised and are as follows:

1. To eliminate horse falls which involve the horse somersaulting.
2. To reduce the number of falls where the horse falls, but does not somersault.
3. To improve protection to riders who are involved in a fall.

BE also wish to monitor the number of falls where the rider becomes unseated and the horse remains standing, i.e. unseated rider falls.

To assess if BE are meeting these aims some key performance indicators (KPIs) have been developed and the next section sets out the five KPIs used to monitor progress towards achieving the BE casualty reduction strategy. These KPIs aid the continuing analysis of the BE Falls database, in assessing the risk to riders in Eventing and identifying areas where potential improvements can be made to reduce this risk.

The results of applying these five KPIs to UK events which occurred in the 2023 season are published in this section of the report. Results from courses held in each season from 2002-03 to 2022 are also displayed to enable the reader to make comparisons between the results.

The five KPIs are as follows:

- Indicator 1 – serious/fatal injuries
- Indicator 2 – somersault horse falls
- Indicator 3 – non-somersault horse falls
- Indicator 4 – unseated rider falls
- Indicator 5 – a weighted combination of indicator 2, 3, and 4.

5.2. Key Performance Indicators (KPIs)

The following KPIs are based on the risk of a fall happening, rather than absolute number of times that a fall occurred.

For example:

a) If course 1 had 1,000 competitors and of these 10 were seriously/fatally injured, the percentage of seriously/fatally injured riders would be 1%.
b) If course 2 had 1,500 competitors and of these 12 were seriously/fatally injured, the percentage of seriously/fatally injured riders would be 0.8%.

In overall numbers of seriously injured riders, course 2 would appear to be the most dangerous course. However, when the number of competitors is taken into account, course 2 actually presents the lesser risk to riders.

5.2.1. Indicator 1 – serious/fatal injuries

Figure 7 shows the value of Indicator 1, the number of seriously and fatally injured riders who fell at fences as a percentage of the number of competitors recorded in the database for each season.

Approximately 0.09% of the riders were fatally or seriously injured in 2023. The difference between the proportion of serious and fatal falls in 2022 (0.07%) compared to 2023 (0.09%) is not significant[2] at the 5% level. This means that there was no statistically significant change in the proportion of riders who were seriously or fatally injured between 2022 and 2023.

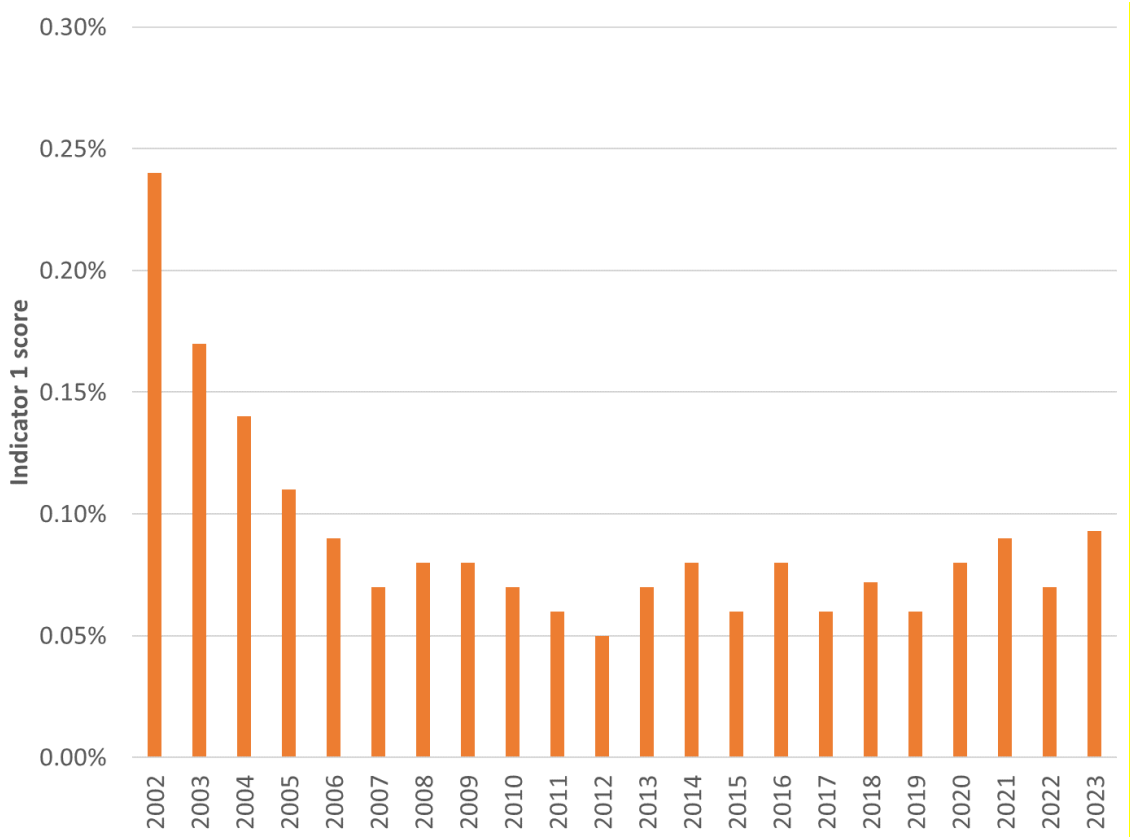


Figure 7: Indicator 1 – Injury severity by season 2002-03 to 2023

[2] Chi squared tests were used to test for significance. This test looks to see if the difference in the proportion of people in two categories is statistically significant. For example, is the difference in the proportion of fatally or seriously injured riders in 2022 and 2023 statistically significant? Within this report we use the convention of the behavioural sciences to report results as 'statistically significant' if the p-value is less than 0.05. A p-value <0.05 indicates that there is a 95% chance that the difference in the comparison being made has arisen due to the variable under investigation, and not due to random fluctuations ('noise') in the data.

From 2002-03, there's a noticeable high score that significantly decreases in the following five seasons until 2007. The years 2007 to 2022 show a relatively stable but slightly variable pattern, indicating that while the severity of injuries has not been increasing, it hasn't continued to decrease significantly either. The last recorded data point, for the season 2023, shows an increase in the indicator score, suggesting a slight (not statistically significant) increase in injury severity for that season.

5.2.2. Indicator 2 – Somersault horse falls

Figure **8** shows values of Indicator 2, the number of horse somersault falls at fences as a percentage of the number of competitors recorded in the database for each season.

The difference between the proportion of somersault falls in 2022 (0.04%) compared to 2023 (0.05%) is not significant at the 5% level. This shows that, although there has been a slight increase in the percentage of horse somersault falls, this change was not statistically significant.

The reduction seen between 2002-03 and 2023 is helping to contribute towards meeting BE's first target: to eliminate horse falls which involve the horse somersaulting. However, similarly to Indicator 1, there has been a relatively stationary trend in the last 10 years for Indicator 2 suggesting that progress has stalled.

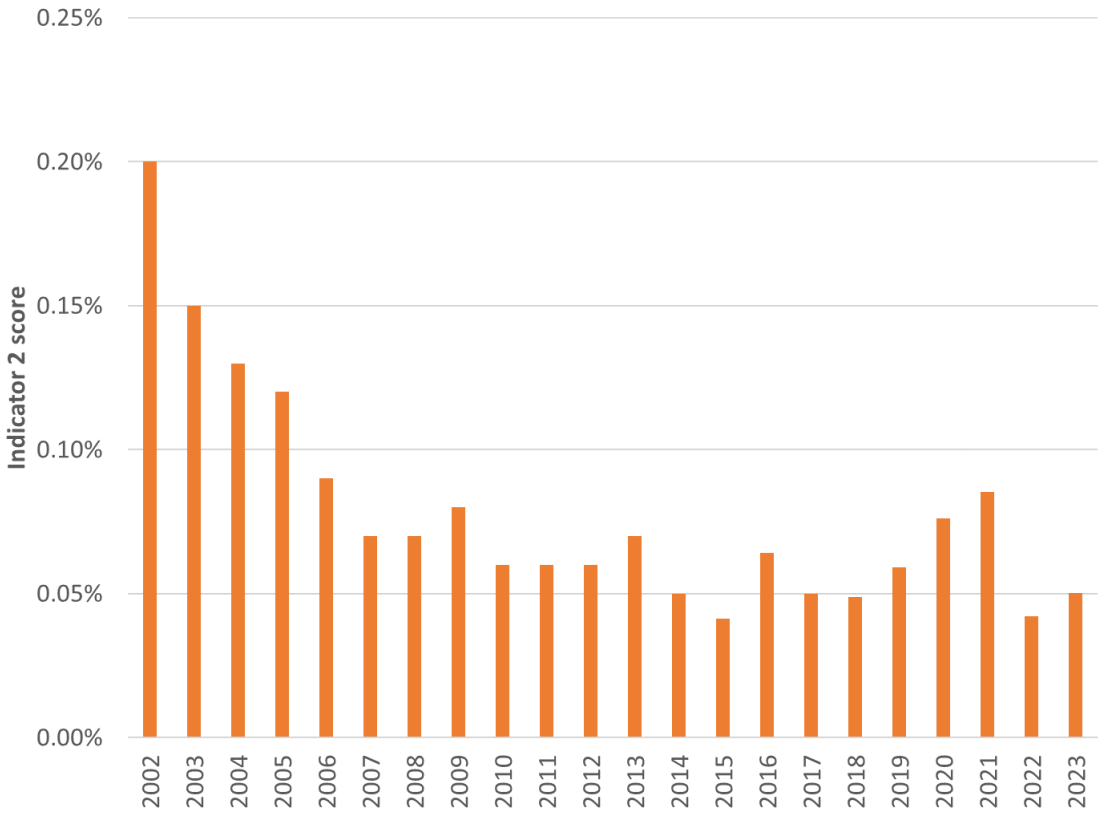


Figure 8: Indicator 2 – Horse somersault falls by season, 2002-03 to 2023

5.2.3. Indicator 3 – Non-somersault horse falls

Figure **9** shows values of Indicator 3, the number of horse falls at fences where the horse did not somersault, as a percentage of the number of competitors in the database for each season.

There was a slight decrease in the proportion of riders who experienced a non-somersault horse fall in 2023 (0.30%) compared to 2022 (0.35%), highlighting BE's success in meeting its second target to reduce non-somersault horse falls compared to last year. This decrease was not statistically significant however at the 5% level.

BE's second target has shown progress since 2002-03 but the recent data suggests this progress may have stabilised.

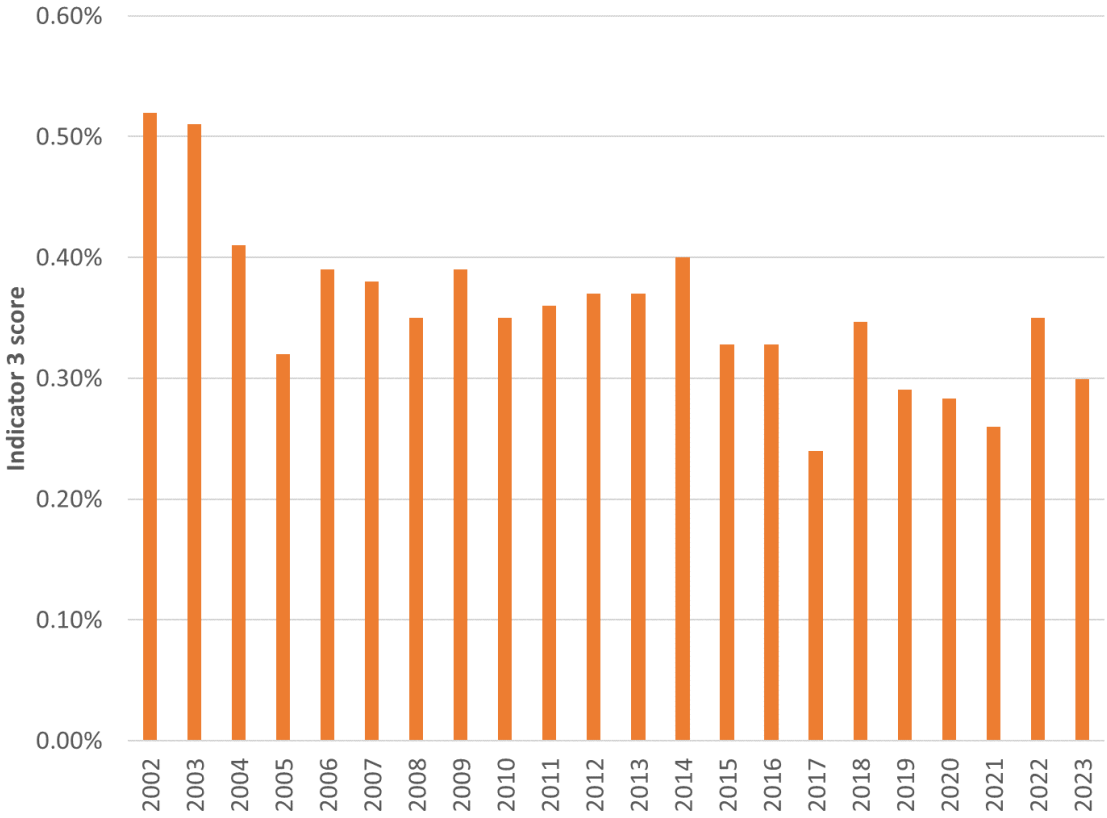


Figure 9: Indicator 3 – Non somersault horse falls by season 2002-03 to 2023

5.2.4. Indicator 4 – Unseated Riders

The number of falls at fences where the rider was unseated is shown in

Figure **10** as a percentage of the number of competitors in the database per season.

The proportion of seriously or fatally injured riders who were involved in an unseated rider fall in 2023 was higher than the proportion in 2022 (2.12% compared with 1.85%). This change was not statistically significant. The general downwards trend since 2003-04 has been a promising sign for BE, however the 2023 figure is the highest since 2016.

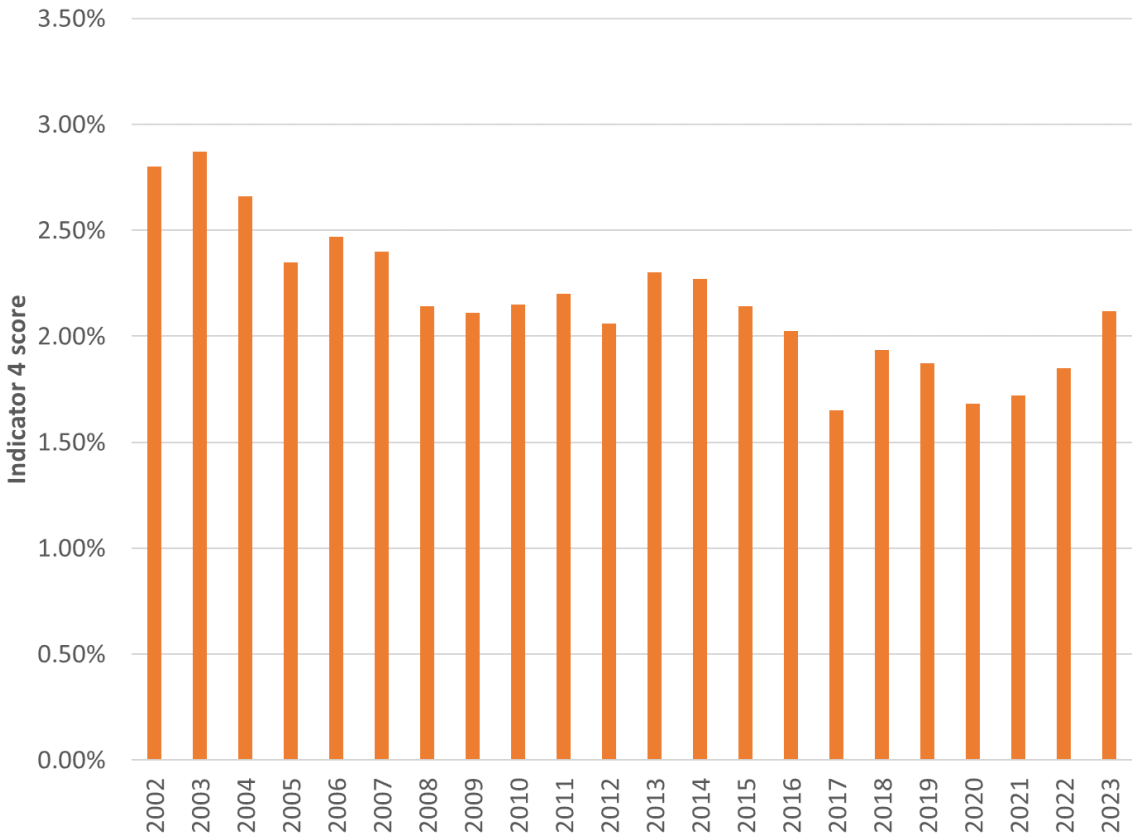


Figure 10: Indicator 4 – Unseated rider falls by season, 2003-03 to 2023

5.2.5. Indicator 5

Indicator 5 is a combination of Indicators 2, 3 and 4 and is used since these latter indicators do not take into account the consequences of different types of falls.

As BE are targeting the "reduction in numbers of riders that are fatally/seriously injured", the Indicators 2, 3 and 4 need to be weighted according to the different risk factors of the various fall types to produce a significant overall indicator. The relative risk factors used for this report have been established on the basis of UK events data collected between 2002-03 and 2023. The advantage of combining the results from the 22 datasets is that a more accurate assessment of the risk of particular falls can be generated. As we saw in Section 4.2.3, the data indicates that:

- 30% of riders in somersault falls are seriously or fatally injured
- 7% are seriously or fatally injured in falls where the horse did not somersault
- 2% of riders are seriously or fatally injured in unseated rider falls

It should be noted that no direct comparisons can be made between the Key Performance Indicator 5 reported in this report and those presented in previous years as the above risk factors are subject to change each year.

Indicator 5 is produced from the following equation:

Indicator 5 = 30 (Indicator 2) + 7 (Indicator 3) + 2 (Indicator 4)

Examples of using this formula:

1) Course A: if 5% of the competitors become unseated and no other falls occur, Course A would have a score of 10.

2) Course B: if 1% of the competitors are involved in somersault falls and no other falls occur, Course B would have a score of 30.

Course B will have a higher score than Course A and therefore would be less desirable.

Indicator 5 result for the 2023 season:

Indicator 5 = 30(0.05) + 7(0.30) + 2(2.1)

= 1.5 + 2.1+ 4.2

=7.84[3]

Figure **11** shows the indicator 5 results by season.

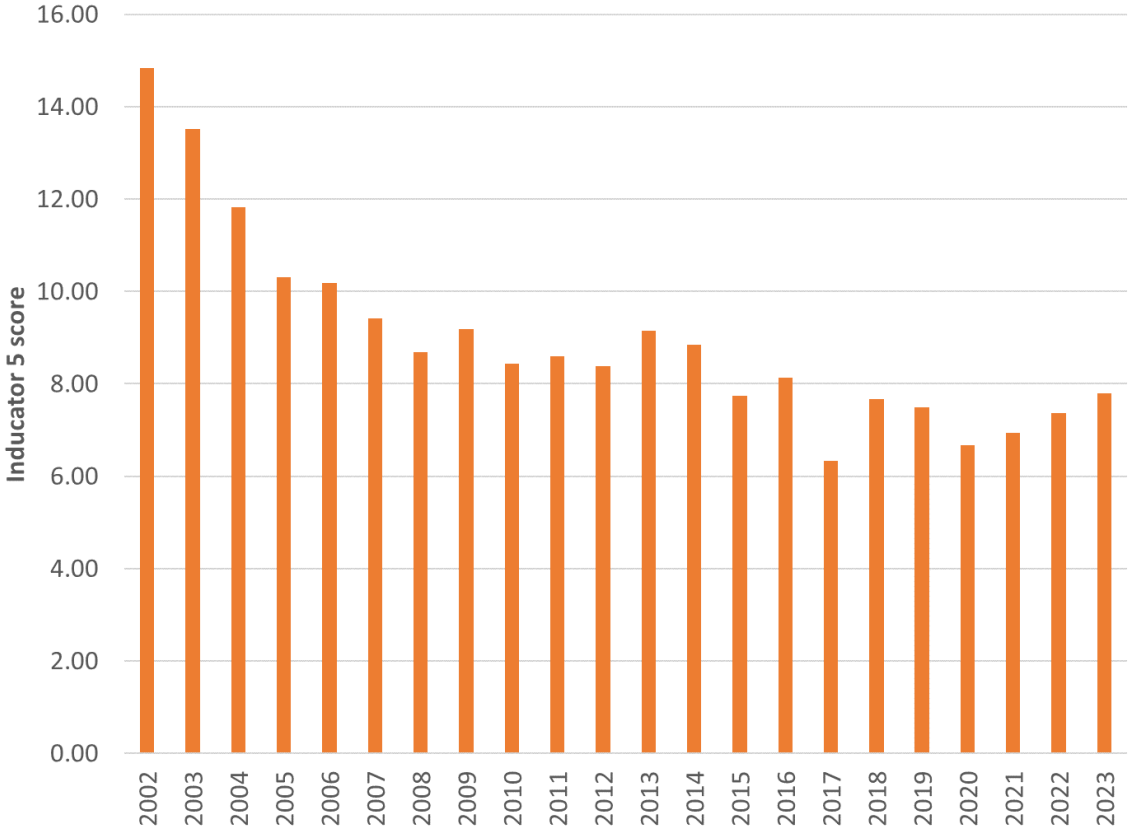


Figure 11: Indicator 5 by season, 2002-03 to 2023

[3] The figures presented have been rounded to two decimal places. However, the Indicator 5 score was calculated using the non-rounded data and hence the addition of the numbers presented in the report does not add up to the total value due of the indicator 5 scores.

The relative risk rating for the 2023 season was slightly higher than that found for the 2022 season. This is to be expected based on the increases in other indicators seen in the earlier results of this section. The general downwards trend appears to have reversed in the last few years, with small yearly increases seen from 2020. BE should continue to monitor this emerging trend.

6. Summary

6.1. Description of courses and fences

There were 429 BE and FEI cross-country courses held during the 2023 season. A total of 43,084 competitors took part in these events (BE events had a total of 39,729 cross-country competitors, while FEI UK events saw 3,355 competitors). The majority of these courses were one day events (89%). BE90 courses were the most common and had the highest average number of competitors per course (235).

Round fences were the most common fence type making up 26% of the total number of fences, followed by Square Spread (18%). Ditch and Trakehner fences were the least common fence types (2% each).

6.2. Description of falls

There were 1,078 falls during the cross-country events in 2023. Of these falls none were categorised as unknown injury severity and hence excluded from our calculations. 89% of riders who fell had no injuries, 8% were slightly injured and 3% were recorded as having serious injuries. There were no fatal injuries.

6.2.1. Falls not at a fence

Of all falls, 98 were not at a fence in the 2023 season. Of these falls, 74 involved only the rider falling, 24 involved both the horse and rider falling and none were recorded as "No Fall" (i.e., the rider dismounted the horse rather than fell).

6.2.2. Falls at fences

In 2023, 980 falls involved a fence; 841 were falls where the rider was unseated, 139 were horse and rider falls, and no falls were recorded as "No Fall" (rider dismounted the horse rather than fell).

- Of the 841 unseated rider falls, 92% had no injury, 7% had slight injuries, 2% had serious injuries.
- Of the 139 falls where both the horse and rider fell at the fence, 71% of riders had no injury, 14% had slight injuries, and 15% had serious injuries.
- 2% (20) of the 980 falls were classified as somersault falls. Somersault falls had a higher proportion of riders with slight and serious injuries than non-somersault horse falls (75% compared with 21%).

On average there were 2.5 falls per course. The Bramham International cross-country course (**** long) held on the 08/06/2023 had the highest percentage of starters who fell (27%). However, this course had a low number of starters (11) compared to the average (98) so caution should be taken when interpreting this result.

The fence element that had the highest proportion of starters that fell was an ascending spread fence (element 6 C and 18 E) at the Bramham International CCI **** long cross-

country course on the 08/06/2023, where 9% of starters fell. Again, this course had a small number of starters (11) so this result may be due to chance. When considering the results for individual courses or fences, care should be employed so that decisions regarding the targeting of injury reduction measures are not taken without full consideration of all potential factors which may affect the results presented.

When looking at the different fence types, Corner elements had the highest number of falls per thousand jumps followed by Trakehner and Ditch elements.

There were 109 falls at frangible elements in 2023. Three of these falls were somersault falls.

Air Jackets were worn in 515 of the 1,078 falls (48%). A similar percentage of riders were injured in these falls compared to incidents where the rider was not wearing an air jacket or the air jacket was not activated.

6.3. Key Performance Indicators

Table 15 summarises the five indicator values for the 2022 and 2023 seasons.

Indicator 1 shows that the proportion of seriously or fatally injured riders has increased slightly from 0.07% in 2022 to 0.09% in 2023. This change was not significant at the 5% level.

Indicator 2 shows that the proportion of somersault horse falls has increased slightly from 0.04% in 2022 to 0.05% in 2023. This change was not statistically significant at the 5% level.

Indicator 3 shows that the proportion of non-somersault horse falls has decreased from 0.35% in 2022 to 0.30% in 2023. This change was not statistically significant at the 5% level.

Indicator 4 shows that the proportion of unseated rider falls has increased from 1.85% in 2022 to 2.12% in 2023. This change was not statistically significant at the 5% level.

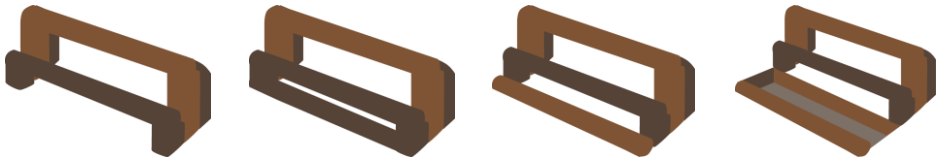
Indicator 5 combines the risk of a serious accident with the probability of being involved in such an accident. This has increased (from 7.37 in 2022 to 7.84 in 2023), meaning that overall risks in 2023 were slightly higher than in 2022. It is not possible to test the significance of this figure.

Table 15: Summary of indicator values for 2022 and 2023

	2022	2023	Difference statistically significant?
Indicator 1	0.07%	0.09%	No
Indicator 2	0.04%	0.05%	No
Indicator 3	0.35%	0.30%	No
Indicator 4	1.85%	2.12%	No
Indicator 5	7.37	7.84	Cannot test

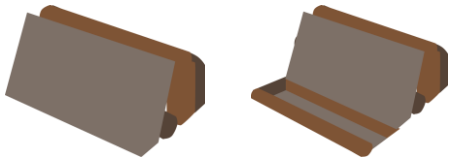
Appendix A Fence Diagrams

A POST & RAILS



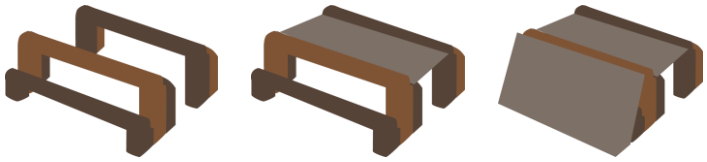
1 2 3 4

B PALISADE



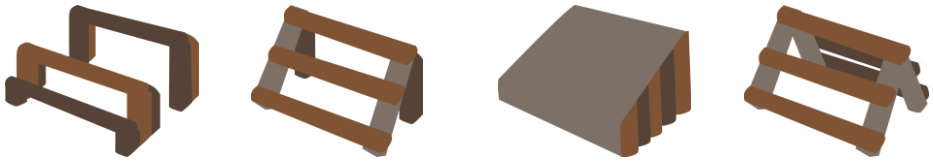
1 2

C SQUARE SPREAD



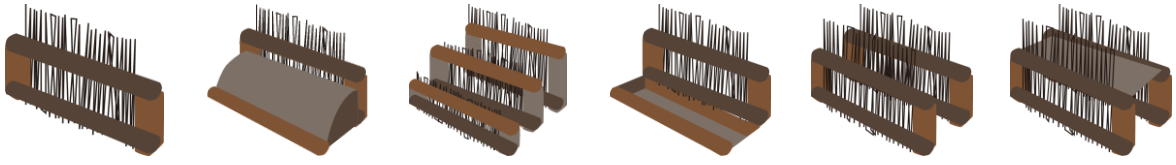
1 2 3

D ASCENDING SPREAD



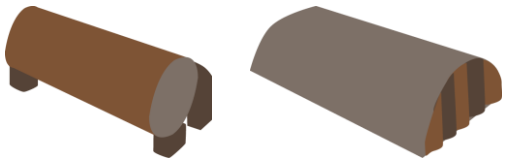
1 2 3 4

E BRUSH



1 2 3 4 5 6

F ROUND



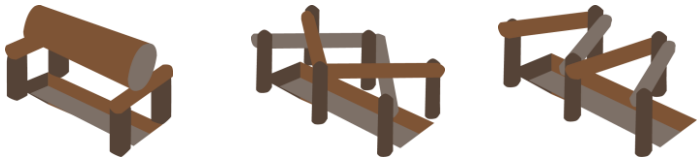
1 2

G CORNER

1 2 3

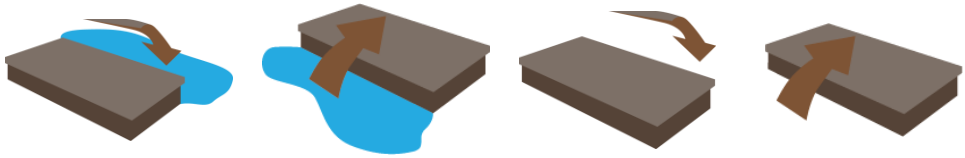
Please state in the remarks column whether **left** (as shown) or **right** corner.

H TRAKEHNER



1 2 3

J STEP



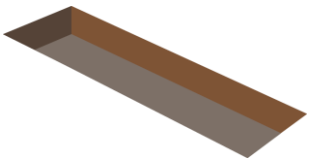
2 3 4 5

Step into water | Step out of water | Step down | Step up

Category (1) is an old category and no longer used.

K WATER

L DITCH



British Eventing Falls Database: 2023 season

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